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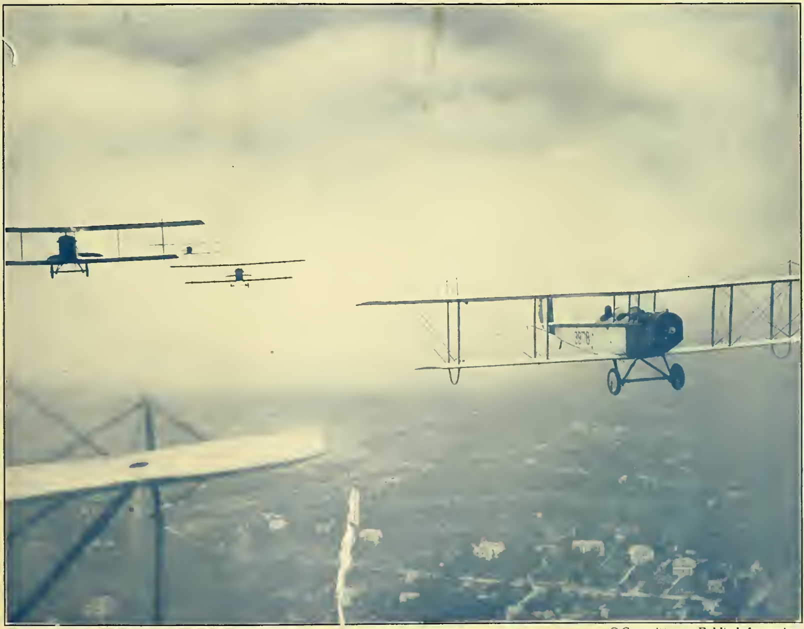
AERIAL AGE WEEKLY

Vol. 7, No. 18 JULY 15, 1918 10 CENTS A COPY



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Official photograph of a squadron formation taken from one of the military aeroplanes

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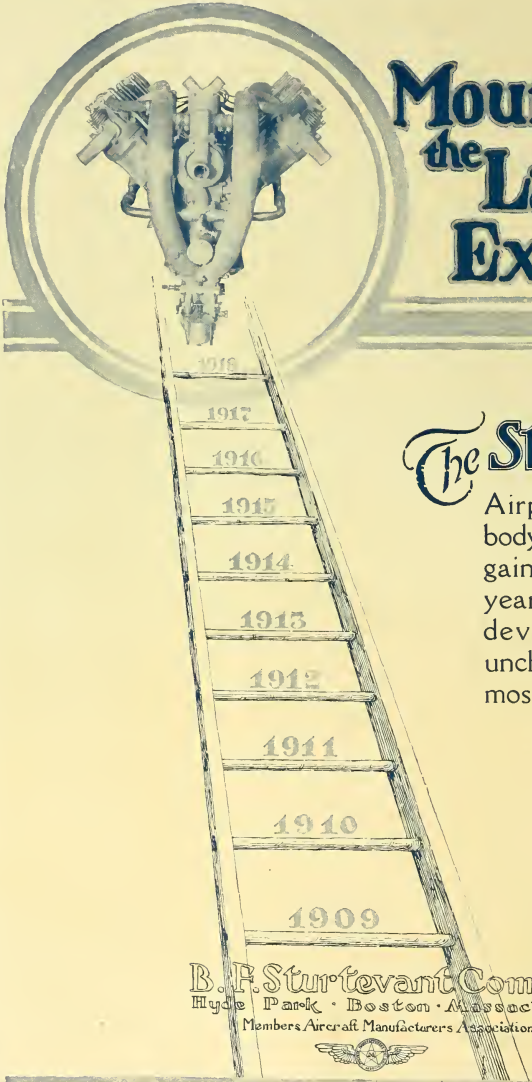
America's First Achievement in Providing Bombing Aeroplanes



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AERIAL AGE
WEEKLY

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VOL. VII NEW YORK, JULY 15, 1918 No. 18

AMERICA'S FIRST ACHIEVEMENT IN PROVIDING BOMBING AEROPLANES

DURING the past week America's first bombing aeroplanes were launched successfully. On July 4th was launched the first American-built Caproni, a biplane, equipped with three Liberty Motors. On July 6th was launched the first American-built Handley-Page, also a biplane, equipped with two Liberty Motors. Both machines were built by the Standard Aircraft Corporation. In both cases the tests were successful and we can anticipate that in the near future bombing machines of these types will be turned out in large numbers, and that America will truly begin to be a substantial help to the Allies, aeronautically, just as we have been of great assistance to the Allies in connection with land operations.

The Launching of the Caproni

The final test flight of the Caproni biplane and the handing of the machine over to the Government took place at the Government Aviation Field at Mineola, Long Island, on the morning of July 4th. There was no formality about it. The plane had had its engines installed at the aviation field and when this had been completed and the engines tuned up, Lieut. Gino, who met his death only a few days later, stepped into the plane and took her into the air for its final test. The machine had been tested several times previously. The performance of the plane is said to have been entirely satisfactory both to the builders, the representatives of the Italian firm, and to the representatives of the Government. The figures as to height and speed are not available at the present time.

Major Tappi, head of the Italian aviation mission to this country, and Major Falchi, of the Italian air forces, represented their country at the experimental flight. Mr. John D. Ryan, Director of Aircraft Production, and General William L. Kenly, Director of Military Aeronautics, and Colonel H. H. Arnold, W. C. Potter of the Aircraft Board, Captain Harvey of the administrative staff of the Mineola aviation field, and Majors Rhinehart and Canady were present at the launching. Captain Hugo d'Annunzio and Lieutenant Belloni represented the Caproni company. Commander Briggs represented the British Government.

Alan R. Hawley, president of the Aero Club of America, said:

"The success of the first American built battleplane is one of the most important steps forward in the building of our air fleet."

In connection with the flight, a cablegram was made public which was recently received by the Italian mission from Captain Fiorello La Guardia, Congressman from New York, who joined the American aviation forces and is now in Italy. Captain La Guardia appeals for the dispatch to Italy of raw materials for the building of aircraft. After expressing his good wishes for the success of the Italian mission he says:

"Please urge the American Government to send to Italy raw materials with which to build aeroplanes. The new type of Caproni war 'plane is a powerful machine, and its success has been proven in the flight from Turin to Rome, in which I participated. Give us raw materials and we will build thousands of aeroplanes here, and our American boys can whip the enemy off the map."

The Launching of the Handley-Page

The giant Handley-Page, with a wing spread of 100 feet and driven by twin Liberty motors of 400 horsepower each, took the air at 4:30.

Without its cargo of bombs, the machine weighs 9,000 pounds, or four and one-half tons, and to drive it requires fuel consumption of approximately sixty gallons an hour. The Liberty motors are in an armored compartment on either side of the fuselage. In addition to its bombs, the machine also mounts two light Browning machine guns, which can be fired from any desired angle.

The pilot was Lord William Semphill, of the British service, and the man who sat in the machine gunner's seat forward was Major General William L. Kenly, U. S. A., Chief of the Department of Military Aeronautics in Washington. The others in the aeroplane were Captain E. T. Waller, of the Canadian Army; Captain E. L. Austin, of the Royal Flying Corps; Young B. Dawkins, an official of the Standard Aircraft Corporation, and an official moving-picture photographer.

Christened "The Langley"

The aeroplane was christened in honor of Langley by Mrs. Harry Bowers Mingle, wife of the President of the Standard Aircraft Corporation.

After leaving the ground at 4:30 the plane made three wide circles, climbing higher each time. It landed at 4:52. Colonel Sempill said it reached a height of 3,500 feet and maintained an average speed of ninety miles an hour.

The "launching" and test were preceded by a luncheon at the plant, to which several hundred guests were invited. Secretaries Daniels and Baker were invited, but were unable to attend. Benedict Crowell, First Assistant Secretary of War, represented the War Department. Senator J. J. Frelinghuysen of New Jersey and Senator Charles S. Thomas of Colorado also were present.

Mineola Planes Flew Over

Two Curtiss training machines flew over from the aviation field at Mineola just before the ceremony. One of them carried General Brancker, of the British Air Forces. Major Rhinehart and Captain Hawley of the Mineola school were the pilots.

Mr. Mingle presented Assistant Secretary Crowell, who expressed the regrets of Secretary Baker, who, he said, was most anxious to witness the flight. He said America was in a position to feel confidence in the outcome of the war, but warned against overconfidence, a mistake into which the Germans fell.

"Our aircraft program is going forward," said Mr. Crowell, "and it will gain impetus as the days pass. And I am confident that the men and women behind the machines will stand to their colors to the victorious end of the great war."

John D. Ryan Speaks

John D. Ryan, director of aircraft production in the United States, followed Secretary Crowell.

"It is a matter of great pride to me," said Mr. Ryan, "to be here today and to witness the launching of this splendid machine, an aeroplane that is British in design and American in construction. The raw materials were all grown in America, the engines were built in America, and the men and women who did the building are Americans. The launching of the machine is an earnest of what the United States is going to do in the future to promote aircraft program.

"This aeroplane is one of the most powerful ever built. It is a type of plane that is driving the Hun behind his own lines, the kind that is keeping him there, and also the kind that is destroying the things behind his lines on which he depends to defeat our boys and those of our allies. And I am glad to tell you that thousands just like this one are under construction, all to be driven by the Liberty motor, the best and the most powerful aeronautical engine ever built. We are now furnishing Liberty engines to our own aeroplane manufacturers, and England, France and Italy have called on us to furnish Liberty motors to them for installation in their own planes. The production of the aeroplane in quantity is easy, but that of the aeroplane engine is another matter. The number of aeroplanes in the last analysis is the number of engines to drive them.

Expected Too Much

"There has been great dissatisfaction expressed by the people of the country at the results attained up to the present in the production of aircraft. Some of it has been warranted—most of it has been caused by expectations beyond the possibility of performance.

"I can speak with knowledge on this subject because I have for two months studied every cause of delay and disappointment, and I can speak freely, because no stretch of my conscience will let me claim any credit for what has been done up to the present day. My connection with the work of aircraft production for the army has been so short that nothing I have done or left undone could possibly have affected the accomplishments at this time.

"Much good work has been done by my predecessors, and I am taking this opportunity to assure the people of the country that, in my opinion, there has been no such delay with the work or anything like such incapacity of those in charge as has been indicated in some of the criticisms of the accomplishments, or lack of them, in production. A few facts will, I think, bear me out.

The Liberty Engine

"In the fifteen months we have been at war there has been designed and put into production the Liberty engine, which is acknowledged by all of the Allies as one of great performance and a distinct contribution to the cause. As a powerful machine to drive heavy aircraft, it is undoubtedly as satisfactory as any engine produced by any nation on either side of the war. There were produced here in our workshops during the months of May and June just past as many of these engines as Great Britain produced of all types of aeronautical engines in the entire year of 1915, at the close of which she had been seventeen months at war. Including other types of aircraft engines, there were more produced in our shops in the month of June than Great Britain produced in the whole year of 1915.

"The representatives of Great Britain's Air Ministry here today have verified these facts, and consider the performance very satisfactory, in view of the fact that prior to our entrance into the war almost nothing had been done here, except by private enterprise, to prepare for aeronautical engine design or production.

Engine Production

"The limiting factor in our production program, as in that of every nation in the war, is engines. The planes proper can be made in any number required, but no nation has yet been able to furnish engines in the quantities needed. All the Allies are today looking to us—calling to us—to furnish Liberty engines to drive their planes and promote their air programs. Two of the best of foreign types of engines have been put into production here in quantity, and are now going overseas to drive planes being built in France and England for our air forces, as well as being supplied for planes we are building here to be shipped abroad.

"We have in course of development another foreign engine of high power, and facilities have been provided for its production in quantity. We are now loading on almost every ship sailing for France large planes equipped with engines and every accessory to fit them for service as soon as they can be assembled on the other side. We have in order and in production a large number of planes of the type you saw flown here today, and the other proven types of large fighting planes are being started in production.

Not 10,000 Airplanes in All

"The people of the country have been carried away with the talk of tens of thousands of fighting and bombing aeroplanes, and have been impatient when they have heard of the few we have produced so far. There never have been 10,000 aeroplanes on either side of this war at any one time, and until within a month, if even now, there have not been 10,000 on all sides and all fronts of the war added together.

"We must learn to think and talk of things we want to win with in the quantities that can be furnished and in the time required to furnish them. We will have aircraft in type, in quantity, and quality to accomplish what we have set out to do—to win the war. We have set that as our mark and in the way of our progress there may be delays and disappointments—but no failure. The men and women who are bending their efforts to make our air forces supreme will have the reward of victory—victory in the air and in the war.

"Our allies have secured and maintained supremacy in the air, and America will add to that such preponderance that no doubt may be felt of the result we have set ourselves out to attain.

"The facilities for the manufacture of aircraft engines and planes are being developed with all speed and skill available—that we now have entered the production stage gives assurance that the country and its Allies will soon realize the benefit of such a fighting air force as will satisfy our people and bring consternation and defeat to our enemies."

Ready to Fly and Fight

General Kenly talked next. "It is my pleasure," he said, addressing the hundreds of working men and women who stood about him, "to congratulate you on turning out the first Handley-Page ever built in America. I consider it an honor, as head of the Department of Military Aeronautics, to accept this splendid machine. We appreciate thoroughly what you are doing for your country, and I am happy to inform you that we are now ready to fly and fight all the machines that can be turned out in the United States.'

General Brancker, who had arrived at the field a few minutes before in an army machine from Mineola, the machine driven by Lieutenant Hardy, U. S. A., followed General Kenly.

Gen. Brancker Speaks

"We in Europe," he said, "France, Belgium, Italy, and England, have been fighting for nearly four years now. Throughout that period we have maintained superiority in the air, but the drain has been great, and we cannot go much further. Neither can Germany go much further, and for the same reason.

"In America you have resources that are unlimited. Than your aviators there are none better. I have seen them in England, and in France, and I speak with first-hand knowledge. We are now trying to build up an air force which will carry the war into the very vitals of Germany, and the type of machine which is destined to cross the Rhine is the type you see before you here.

Liberty Motor Praised

"And now a word about the Liberty motor. It has been much criticized. In England we have been backing it for nine months, and we are building a big program, and in those machines we are using the Liberty motor. I have a cable in my pocket now which will make our American comrades tremble, for in that cablegram I am delegated to ask them to let us have still more Liberty motors, and have them before the end of this year. The Liberty motor is a success. You may be assured of that.

"And in conclusion may I be pardoned if I suggest that none of us be too optimistic. I think that our accursed optimism has been the cause of a great deal of our trouble. This is a hard and a long war, and it is not going to be won until every one of us is doing his utmost in whatever capacity he or she is best fitted to make the right end possible."

Sir Joseph Fowler, of the British Mission, also had a good word to say for the Liberty motor. He had just returned from a tour of American aeroplane plants.

"What we witness here today," he said, "is an earnest of what is going on all over this country, and we are going to get from the United States what is going to give us an overwhelming superiority in the air. And I want to say that the Liberty engine is one of the finest aeronautical motors ever built. No engine was ever more appropriately named, and it delights me to see the spirit in which the men and women who are building the Liberty motor are working."

Other Speakers

Senator Frelinghuysen spoke next. "It is an eye for an eye and a tooth for a tooth," the Senator said, "and it is the airship like this one which is going into the hinterland of Germany. These machines will win the war, and, if necessary, we are going to drive the Hun from the face of the earth."

"This event," said Senator Thomas, "is an epoch. It is an indication of what America intends to do to win this war." Senator Thomas closed by saying that he hoped the Allies would give Germany the same kind of treatment that Germany would like to give the Allies.

After the trial of the Handley-Page, Lord Simphill made a flight in the De Haviland scout machine. He struck bad ground when he landed, and the machine was overturned, but the pilot escaped unhurt.

Others Present

Among those present were: Mr. Henry A. Wise Wood, Rear Admiral Bradley A. Fiske, President of the U. S. Naval Institute; Colonel H. H. Arnold, Lieutenant Godfrey L. Cabot, President Aero Club of New England; Mr. Evan J. David, Business Manager of *Flying;* Lieutenant H. K. Black, R. F. C., Associate Editor of AERIAL AGE; Mr. N. E. Jennett of *Flying,* and Mr. Sherbondy.

SIR WILLIAM WEIR, BRITISH AIR MINISTER, ENDORSES LIBERTY MOTOR

"TESTS which recently have been applied in France and this country to the latest American engine have justified the prediction that it would prove a most valuable contribution to Allied resources, and the United States can go ahead and push its production with every confidence."

Those are the words of Sir William Weir, new Secretary to the Air Ministry, who presided at the Wilbur Wright lecture delivered by Dr. Durand, scientific attaché of the American Embassy, in the Central Hall at Westminster. In thanking Mr. Durand for his lecture Sir William said the lecturer's suggestion would be studied by all technical members of the government and by all engaged in the application of aeronautical science to manufacture.

Sir William then paid tribute to the skill, ingenuity and technical capacity of the aircraft designers of Great Britain. The new policy of intrusting pure design to the industry itself has been very successful.

Great Progress Made

Great as was the advance in aeronautics in the first two years of the war, he said, the last year had marked even greater progress. The rate of advance was being accelerated.

Sir William thought he could define the Allied technical position in relation to the enemy by saying the Allied technical superiority at the present time was equal to the superiority in the human qualities of skill, enterprise and endurance displayed by Allied pilots.

"The progress and development of the air department were so rapid," said Sir William, "that we were never content with our existing situation or unduly confident of our future efforts, but today we have a solid foundation of full and wholehearted coöperation by the United States upon which to rest assured of the future. In this bitter struggle the United States has stimulated our hearts and fed us from the day she declared war.

"In the assistance given us in aerial warfare," he continued, "the United States has already rendered us a very great aid in the way of personnel. Reports of the work of American pilots have already appeared in the press. Their officers and men have won golden opinions from all with whom they have come in contact. It is the universal opinion that they are unsurpassed in their energy and modesty, for their willingness to learn and their desire to coöperate in everything. So far as personnel is concerned, we entertain the fullest confidence in the future success of the American air force.

Assured of Material

"With regard to material, we may now begin to speak with equal confidence. Tests which have been recently applied in France and in this country to the latest American engine justify us in predicting that it will prove a most valuable contribution to the Allied resources. The United States can go ahead and push the production of this motor with every confidence. The results of the experiments so far obtained have placed the engine in the very first line of aeromotors. It is well understood that some criticism will be directed against the slowness of production of these motors during the last three or four months, but I would like to point out that a considerable interval will, and always must, elapse between the experimental and commercial production of any new motor.

"Every engine, even the best designed and in a country with the greatest resources and facilities, cannot escape a period of what may be called 'teething troubles' before the motors can be produced on anything like a large scale. The Liberty engine is, accordingly, an example of what the Allies might expect in the matter of aircraft production from the scientists and designers of America whom Mr. Durand represents.

"The various methods of utilizing aircraft in warfare are growing rapidly, so rapidly that it is perfectly clear that, even with all the help America can give, the fullest demands which could be made to fulfill all the different functions of aircraft will never be met during the war. We will always require more aircraft, with personnel, than can be possibly supplied today."

THE NEWS OF THE WEEK

Eighteen American Aviators Show Battle Formation

A remarkable demonstration of military formation flying was given on July 4th by three squadrons from the Mineola army air station. They flew over New York City in American planes in formation and presented the most thrilling feature on America's Independence Day programme.

Major C. K. Rhinehardt, commanding officer of the First Provisional Wing, led the splendidly knit squadron on its Fourth of July flight, and putting his command through maneuvers, stirring and faultless, brought convincing proof to the thousands of delighted civilians in the streets below that America in the air was prepared to live up to the brightest traditions of the American soldier and sailor. This air fleet was a fighting fleet, disciplined and letter perfect.

The squadron took off at the Mineola field and went into battle formation over Belmont Park. Crossing to Manhattan, it flew with even and accurately held formation to Van Cortlandt Park; turned there and followed the Hudson and Riverside Drive to Grant's Tomb, where it broke formation, and then the individual pilots went through a long sequence of "stunts" by far more thrilling than any mere fireworks display could have been. Thousands stared at this daredevil mastery of the upper air until every muscle in their necks strained and ached.

Capt. F. H. Harvey, Harvard, 1918, officer in charge of flying, First Provisional Wing, was second in command of the crack flying corps, which, by its public exhibition, thrilled the public of New York for several hours. Lieuts. Davidson, Roullot and Boggs were the flight leaders. The squadron was all-American from its pilots to the last strut and rivet in the machines.

Capt. Boyriven, French adviser to the First Provisional Wing, joined the squadron, flying an American-made scout painted in deep green, and this machine he put through every "stunt" in the manual of the air-fighter. A large Caproni machine also joined in the remarkable celebration, as well as a British aero piloted by Captain J. F. Morris, the British ace, who has 29 German machines to his credit.

There were three formations of six machines that flew over New York. They were preceded by two scouts, one piloted by Captain Boyriven, another by Lieutenant Jones. They landed in Van Cortlandt Park in the morning and joined the formations in the afternoon.

The most remarkable spectacle was presented when the formations reached the Hudson and the formation broke at 5,000 feet and formed again at 2,000 feet. This was repeated over Herald Square.

The squadrons also volplaned down to circle around the French, British and American ships on the Hudson.

The energetic leader, Major C. K. Rhinehardt, and his able assistant, Captain Harvey, made a landing at Van Cortlandt Park.

Gen. Kenly Named for Aircraft Board

Washington, July 6.—The ex-officio membership on the Aircraft Board formerly held by the Chief Signal Officer of the army, has been transferred under executive order to the Director of Military Aeronautics, Major Gen. William L. Kenly. A War Department statement announcing the order to-day says:

"A chief of the air service will not be detailed so long as the Bureau of Aircraft Production is operating as a separate bureau."

Appointment of Major B. H. Gitchell, National Army, as chief of the Industrial Relations section of the Aircraft Production Bureau was announced.

Messrs. Hawley and Woodhouse Called by Senate

Alan R. Hawley, president, and Henry Woodhouse, member of the board of governors of the Aero Club of America, have been asked by the Senate Committee on Aircraft to go to Washington to confer with the committee. The invitation came from Senator Charles B. Thomas, chairman, and from Senator James J. Reed, of the Senate Committee on Aircraft. Senator Thomas's telegram was as follows:

"The Committee on Aircraft will be glad if you will give it the benefit of your suggestions on Monday about 10 o'clock at the room of the Senate Committee on Military Affairs, Capitol building."

Senator Reed stated that the committee is anxious to do everything possible to speed up the production of aircraft and lead to the building of air forces large enough not only to fight the Germans but to win the war.

Major John Purroy Mitchel, ex-Mayor of New York, who lost his life in an accident on July 6, while flying at the Gerstner Field

Unveiled Tablet

Madison, New Jersey, celebrated the National Holiday extensively. Among other events was the unveiling of the bronze tablet as the memorial of Annabel Scharff Roberts, the first citizen of Madison and the first American army nurse to give her life for her country in France. The Tablet was placed in the Public Library of Madison.

Representatives from the allied forces attended the ceremony, being, Captain R. Baffrey, of the 102nd Regiment of the French Artillery, Lieut. H. K. Black, R. F. C., C. F. A., representing the British Army, and Lieut. Marcel Saive, representing the Belgian Army.

The dedicatory address was made by President McCracken, of Vassar College. During the ceremony, under orders from the War Department and in recognition of Miss Roberts' services to her country, Major Thomas Hitchcock, and Lieut. Harold Wilson flew aeroplanes from Mineola aviation field over the spot.

Vienna Air Mail to Budapest

The Hague.—The *Pester Lloyd* publishes an interview with the Hungarian Minister of Commerce respecting the new postal air service between Budapest and Vienna, which starts on June 27th.

The Minister said that the difficulties of delivering telegrams in Budapest had compelled him to establish a postal air service between Budapest and Vienna which would be the first civil postal air service between these cities.

The dispatch of mail from Budapest is started between 4 and 5 P. M. The return dispatch from Vienna begins the next morning, the arrival taking place between 7 and 8 A. M. in Budapest. The mails will be conveyed from the place of arrival to the general Post Office by motor car.

Special stamps are to be issued for this service. The stamps show the Parliament buildings and bear an inscription.

Besides this service there will be established within six weeks a new air postal line in Hungary. There is already such a line between Vienna, Lemherg, and Kiev.

Airmail Rates to be 16 Cents

The aeroplane mail rates are to be lowered to 16 cents. "What goes up must come down," said Postmaster General Burleson, and, figuring that the aerial mail could cut rates as well as corners, he issued a statement a few days ago announcing the change.

Hereafter one's correspondence that goes "as the crow flies'" will flutter along at an altitude of 16 cents instead of the present level of 24 cents.

This will make a rate of 6 cents for the first ounce, and the usual ten cents for special delivery, with 6 cents more for each additional ounce or fraction of an ounce.

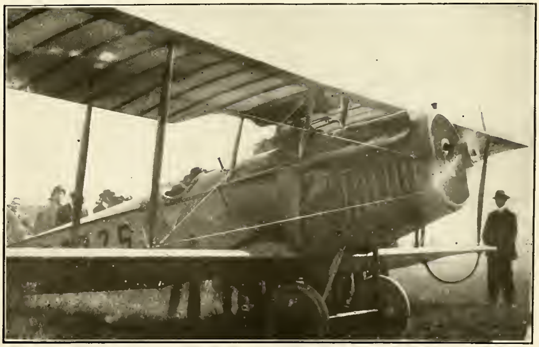
And, incidentally, the service is improving daily. Try it by sending an aeropost letter daily!

"Keep Off" Signs of Switzerland

Following upon the last violation of Swiss neutrality by the bombing of Porrentruy by unknown aviators, the Swiss Government has proposed to the belligerents that the Swiss frontier be marked at night by elevated colored lights. France and Germany, it is reported, have already given favorable replies.

Increasing Effectiveness of Anti-Aircraft Artillery

Aerial progress has not been confined to the air, for anti-aircraft artillery, if it can be considered as part of aerial activity, has advanced by leaps and bounds of late. At present it is a common occurrence to hear that an enemy machine has been brought down by anti-aircraft fire. Typical of this advance is the case of the 10th Section of French anti-aircraft artillery of the mobile type, which, during the period from September, 1915, to December, 1917, alone brought down 13 German aeroplanes. During the period from February 11th to 20th, last, the anti-aircraft artillery of the French army brought down four machines. In each case the number is based on official recognition, which means that the destruction of each enemy machine was established beyond doubt.



The Hispano-Suiza motored Curtiss biplane used for aerial mail carrying

Aerial Mail Envelopes Bring $10,000 for Athletic Equipment

Three envelopes sent by aerial mail and presented to Mrs. Charles A. Van Renselaer, chairman of the National Aeronautic Committee, by Mr. Alan R. Hawley, president of the Aero Club of America, brought $10,000 for athletic equipment. The auction took place at Oyster Bay while twenty aeroplanes in thrilling exploits were viewed by several thousand persons gathered on the estate of Mortimer L. Schiff on Saturday afternoon, July 6th, to assist in raising $52,000, to provide athletic and musical equipment for all the aviation training camps in the United States. It is believed about half the sum was obtained.

While the throngs were gathered on the lawns the aeroplanes from Mineola, twenty miles away, appeared. The aviators went through various stunts and then changed to conflict formation and staged a "fight" over the hills and waters of the bay. Following this one machine darted away from the others and went to a height of about 10,000 feet. There the aviator did the spiral, falling leaf, step-ladder, vrille, tail spin and banking.

Leonard in Glove Bout

The aeroplanes then formed again and flying hardly fifty feet over the tree tops dropped copies of "The Star-Spangled Banner" to the crowd.

Mr. Schiff had erected may tents and in each there was entertainment of varied nature. Sam Harris was in charge of the vaudeville bill, which included Private Irving Berlin, from Camp Upton; Dorothy Jardon, Eddie Wynn, Jack Hazard, Mollie King, Donald Brian, Jane and Katherine Lee and several soldiers from Camp Upton.

Benny Leonard, the lightweight champion, boxed with "Dutch" Brandt and "Young" Eddy, both privates at Camp Upton. There were bayonet combats between instructors and men of the army and Allied armies.

Burr McIntosh auctioned off a letter sent by the first mail aeroplane. It brought more than $3,000. Original drawings also sold for high prices.

Many Notables Present

Among those present were Major General and Mrs. Franklin Bell, Rear Admiral Wm. N. Little, U. S. N.; Brigadier General W. A. White, Captains D'Annunzio and Volomie of the Italian army, Lord and Lady Wellesley, Lieut. Santiago Campuzano, Commander Blackwood, Captain Bath, Walter J. Salmon, Mr. and Mrs. Henry Sanderson, Mr. and Mrs. F. L. Hein, Mrs. Henry Duryea, Mrs. Charles A. Van Rensselaer, Mrs. Edward W. McKenna, Mr. and Mrs. Irving Brokaw, Mr. and Mrs H. P. Davison, Mr. and Mrs. Henry P. Shonnard, Mr. and Mrs. J. Harriman, Mr. and Mrs. George Baker, Mr. and Mrs. C. H. Goddard, Mr. and Mrs. Clinton Gilbert, Mr. and Mrs. E. F. Hutton, Mr. and Mrs. Frank Remington, Mrs. Charles B. Alexander, Mrs. Thomas Hitchcock, Mrs. Burke Roche, Augustus Post, Mrs. John S. Phillips, Captain Spinola and Colonel Binda of the Italian army, and Mr. and Mrs. Henry L. Batterman.

Mrs. Herbert M. Harriman, Mrs. Joseph W. Harriman and her daughter, Miss Miriam Harriman; Mrs. W. M. Fleitmann and Miss Lida L. Fleitmann, Mrs. Frederic R. Coudert, Mrs. William Laimbeer and her son, Mrs. Julian Peabody, Mrs. Barger Wallach, Mrs. Nelson B. Burr, Mrs. Ansel Phelps, Mrs. Morton Schwartz, Mr. and Mrs. Frank C. Henderson, who were with Mr. and Mrs. James Lowell Putnam; Mrs. Le Roy Baldwin and her daughter, Miss Lucile Baldwin, the latter being with the Misses Katherine and Ellin Mackay; Miss Madeleine Liebert and her sister, Mrs. Neustadt; Mrs. Sidney Fish, Mrs. Whitewright Watson, Mrs. Oliver Bird, Mrs. I. Townsend Burden, Miss Evelyn Burden, Mrs. William H. Erhardt, Mrs. George Rose, Mrs. Charles A. Van Rensselaer, and many others.

Aeroplane Postal Service to Corsica

According to the Paris daily press, an aerial postal servcie will soon be organized between Nice and Corsica, and it will be carried out by the use of hydroaeroplanes. The landing place in Corsica has not yet been fixed, but it is likely that Ajaccio will be chosen for the purpose, it being the terminal of the railroad line, and besides it affords a very good landing place for hydroaeroplanes. The distance to be covered in a straight line is about 150 miles. A great advantage will be secured by the present service, for it will allow of carrying all the ordinary letters, while the packages classed as mail matter will be transported by boat as usual. A postal hydroaeroplane of improved type will carry upwards of 450 pounds of mail on each trip. Letters will arrive in Corsica in much less time than before, for the trip can be made in a few hours.

Aero Post Among Allies

Latest advices are that aerial postal communication will soon be established between the Allies. Such a method of communication would connect London, Paris, Nice, Rome and Brindisi. Gen. Bongiovanni, head of the Italian aviation, is fathering the plan.

Du Pont Gives Y. M. C. A. Aeroplane

New York—Irenée Du Pont, head of the Dupont interests at Wilmington, Delaware, has presented to the School for Aeroplane Mechanics, conducted by West Side Y. M. C. A., of 318 West Fifty-seventh street, New York City, a complete aeroplane, which is to be brought here for the use of the school. F. F. Tenney, principal, and W. D. Davis, instructor, have gone to Claymont, Del., to inspect the gift and bring it here, in the air if practicable, to save transportation. The plane is a Curtiss J.N.-4 military tractor biplane. Mr. Du Pont's letter announcing the gift says among other things: "We have concluded, in view of the national importance of your school, that we will make a donation of the machine to you."

The School for Aeroplane Mechanics has grown so rapidly since it was opened last fall that it has been necessary to rent additional quarters. Part of the building at 240 West Fifty-third street has been in use from the beginning and is in operation from 8 A. M. till 11 P. M. daily except Sunday. In June, 221 students were enrolled, a total of 921 for the seven months. The new quarters are at 239 West Fifty-sixth street. The plane instruction will be given here, the old school being devoted to engine work. The new arrangement will double the capacity of the school, which was started when the government made its appeal for competent machinists to care for the fighting plane fleet building, and is run at cost as a patriotic service.

Wardrop Leaves for Europe

G. Douglas Wardrop, Editor of AERIAL AGE, left an Atlantic port last week for Europe, where he hopes to make a personal study of the aircraft situation at first-hand for the benefit of the readers of AERIAL AGE.

He will return early in the Fall and it is expected that the results of his investigation, and the interviews, and the editorial material which he will bring back will have immense significance for the American aeronautic industry.

Ensign Potter Gets First Seaplane

Ensign Stephen Potter, United States Naval Reserve Force, who was killed in action on April 25th, is credited with shooting down the first German seaplane destroyed by an American naval aviator. Photographs, taken from a seaplane, showing the enemy plane in flames and in the water, have been received by the Navy Department.

A report of this action states that on a long distance reconnaissance of the German coast was made by large American flying boats operating from a British Royal airforce station. Two American naval aviators accompanied this expedition and one of them, Ensign Potter, was successful in shooting down a German seaplane which attacked the formation. A second enemy machine was put to rout at the same time. After making a highly successful reconnaissance flight, the seaplanes returned to their base, having sustained but slight damage.

Aeroplane Mail Hours

Aeroplane mail will be received daily except Sunday for Philadelphia and Washington at the postal stations in New York City up to ten minutes before the hours of leaving:

	A. M.		A. M.
G. P. O.	10:50	U	10:20
A	10:35	V	10:30
B	9:47	W	10:25
C	10:35		
D	10:20	Y	10:30
F	10.30	College	10:05
G	10:35	Fox	8:26
H	10:25	G. Cent.	10:55
I	10:20	H. G.	10:00
J	10:20	Hud. Term.	10:45
K	10:25	M. Sp.	10:30
L	10:20	Penn Term.	11:15
M	9:52	Times	10:40
N	10:30	Tomp	9:40
O	10:35	Tremont	8:06
P	10:20	Wall	10:20
R	8:43	Wasb	9:46
S	9:53	W. F.	8:15
T	8:35		

Ordinarily letters despatched by aeroplane are in the hands of the addresses in New York and Washington at approximately 4 P. M., and in Philadelphia at 2:30 P. M.

Patchogue Flier Honored

Patchoque, L. I.—Mr. and Mrs. Seward S. Smith of this place have received word confirming the report of their son, Kenneth R. Smith's achievement in sinking a U-boat from a seaplane, and stating that as a reward he has received from the French Government the Croix de Guerre, and will be appointed to a Junior Lieutenancy in the aviation service.

MOVE TO PROTECT BOSTON

Anti-Aircraft Guns to be Emplaced in the Public Garden

Boston, July 8.—The War Department asked and obtained permission today to locate anti-aircraft guns on the Boston Public Garden. The plan is to build concrete emplacements near Arlington Street and Commonwealth Avenue, and the work will be done under the direction of the Engineers Corps.

Mayor Peters notified the Park and Recreation Board of his approval of the plan.

Part of the Aero Mail Mechanical staff at Belmont Park. Left to right, upper row: Albert Pfaff, Assistant Motor Mechanic; Raymond Heck, Chief Mechanic and Sergeant; Raymond Toole, Supply Sergeant;. Albert Sutton, Assistant in Charge of Transportation; D. Bugois, Motor Expert. Lower row, left to right: James Edmonds, in Charge of Transportation; I. Bielis, Electrician; J. Wallmark, in Charge of Wings and Woodwork.

The AIRCRAFT TRADE REVIEW

Building New Addition

Ground has been broken for the new addition to the Doehlers Die Casting Company's Brooklyn factory on Court and Huntington Streets. It will cover 30,000 square feet and will be ten stories high, actually doubling the present capacity of the plant. Construction will be of steel and concrete. It will be ready for occupany before the summer is over.

Opening a Foreign Department

The Esta Company, manufacturers of the Esta water auxiliator have opened an export department at 106 Fulton Street, New York. Several large contracts which have recently been closed have necessitated this.

Commercial Aeronautics in Siam

The first annual general meeting of the shareholders in the firm of Barrow, Brown & Co., Ltd., the well-known firm of merchants, who have supplied aircraft material in the past to the Siamese Flying Services, took place at the Company's office in Bangkok, on March 9th, Mr. W. A. Graham being in the chair.

The directors' report and balance sheet were adopted, and a dividend declared of 10 per cent. for 1917. The report showed that in addition the position of the company has been strengthened by ample reserves.

Mr. Brighouse was re-elected a director, and Mr. Leatherbarrow was also voted a member of the board. Mr. Donaldson was re-appointed auditor.

Mr. A. Huetter Now Vice-President and General Manager

Mr. A. Huetter, efficiency engineer who is a well-known personality among his colleagues and who is formerly of Chicago, held the position as superintendent for a number of years with the Boonton Rubber Mfg. Co., of Boonton, N. J.

About two years ago a call to Dayton, Ohio, resulted in a position as head of Delco Bakelite department, from which he resigned on April 1, 1918, to take up his duties as Vice President and General Manager with The Premier Rubber & Insulation Co., of which he is the founder.

Property was purchased in North Dayton and a plant completed April 1, 1918. The plant consists of a one-story brick building, 68' front by 100' depth with its own power house. The floor space is divided into three main departments First—tool room, second—hard rubber moulding and vulcanizing and third—Bakelite moulding.

In the Bakelite department, moulded insulation is being produced. This insulation is used for starting, lighting and ignition systems for the aeroplane and automobile.

Mr. Charles Bohn, formerly of the Aluminum Castings Company, of Cleveland, who has organized the Chas. B. Bohn Company of Detroit

Charles B. Bohn, one of the pioneers in the making of aluminum castings in this country, and for the past ten years a prominent factor in the Aluminum Castings Company, of which organization has was General Manager, has withdrawn and has organized his own company, The Chas. B. Bohn Foundry Company.

Mr. Bohn withdrew from the Aluminum Castings Company on April 15, 1918, shortly thereafter organizing and incorporating his own company under the laws of the State of Michigan, capitalization being $300,000, all common stock, and all of which has been paid in. The new company has started in business under most auspicious circumstances. Mr. Bohn is probably as familiar with the aluminum foundry business as any one in the country. The new company has located itself, at least for the present, in the buildings formerly occupied by the Motor Castings Company, on Hart Ave., Detroit. The foundry, which has been used for the production of iron castings, has been converted into one entirely suited for production of aluminum castings on a very large scale. Extensive alterations have sometime since been completed, and several new units are in process of construction, which, when completed, will make this foundry one of the largest ones in Detroit, and in the course of a very short time, the production of this new plant will be approximately fifty thousand pounds aluminum and brass castings per day. The units in process of construction will embody several distinctive features, which Mr. Bohn has based on his experience of approximately twenty years in the industry.

Among the features in the technique of the melting of metal. Mr. Bohn introduces for the first time in the Aluminum Castings Industry, the use of the Electric Furnace.

Mr. Bohn first entered the foundry industry when he became Secretary and Treasurer of the Central Brass Foundry in Cleveland, in 1902. Later the name of this foundry was changed to the name of Allyne Brass Foundry, of which organization he became Vice President. About this time the foundries were experimenting with the castings of aluminum, but a great many of them, finding so many difficulties in the way, gave up the idea entirely, and predicted that the making of aluminum castings would never be a commercial success. Mr. Bohn persisted on the other hand that the aluminum could be cast commercially, and in due course this foundry was able to solve the difficulties that were being enocuntered, and succeeded in perhaps first producing commercial aluminum castings. In the course of time, this organization developed and a foundry was erected in Detroit, Mr. Bohn then removing to Detroit, and becoming Vice President and General Manager of the new company. In due course the Aluminum Castings Company was formed, this company combining several small and separately owned plants in the one organization. Mr. Bohn became General Manager of the Aluminum Castings Co. in 1912, which post he has occupied up to the time of his withdrawal in April.

Mr. Bohn, in addition to being President of the Chas. B. Bohn Foundry Company, is Vice President of the Mich. Smelting and Refining Company, and Peninsular Refining Company, both of Detroit; and Treasurer of the Lake Erie Smelting and Refining Co., of Cleveland, and the Detroit Electric Furnace Co.

Change in Name

Owing to the confusion with other business names of a like meaning, the Automotive Parts, Inc., have decided to change the name of their corporation, and will hereafter be known as The Automotive Sales Company. Their requests to be allowed to make the change has been granted under the Michigan laws.

Aero Engine Production

The Willys-Overland Company produced more than one thousand aeroplane engines in May. The war profits of the company for the year may reach $8,000,000.

John Willys has said that twenty planes and four flying boats are produced daily by the Curtiss and Overland Companies.

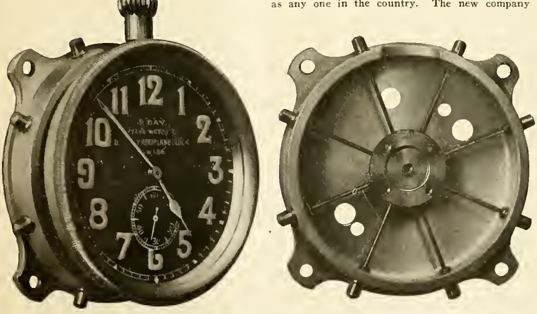
A New Corporation

A new aeronautical corporation which has just been formed is the Crescentini Airship Corporation, of Manhattan. It is capitalized at $100,000. Its officers are Messrs. F. C. Haven, G. Doyle, and L. Cresentini. Their offices are at 149 Broadway.

To Settle Aviator's Estate

Surrogate Fowler yesterday granted the petition of Mrs. Susan E. Mansfield of New London, Conn., mother of the late George Gibbs Mansfield, known as Richard Mansfield, 2nd, for letters ancilliary to settle his estate. Young Mansfield, a son of the actor, was killed in a flying accident at Fort Sam Houston, Texas, April 3.

Mrs. Mansfield states in her petition that she is the mother and legatee of the estate of the dead aviator and that at the time of his death they were both residents of New London. The will was probated there. It disposes of an estate valued at approximately $14,000, of which $13,000 consists of property in New York City.



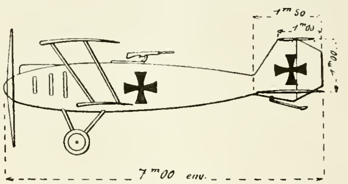
One of the most efficient shock absorbing devices designed to mount aeroplane clocks and aeronautical instruments, has just been imported by A. Wittnauer & Company, of New York. The device is protected by Swiss patents and, as will be seen by the accompanying illustration, is a marked improvement on former holders due to its simplicity, strength and compactness

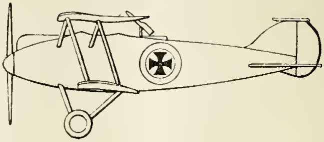
A GERMAN "MYSTERY" BIPLANE—THE H. W.

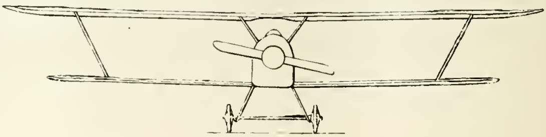
Occasional reports have been received from France regarding a new type of German machine, having a biplane tail. These reports have differed as to the exact shape of the machine, but all agreed regarding the biplane tail. One of these machines has been brought down in France, but, unfortunately, the description of this machine is not as complete as could be desired, owing to the fact that the only machine which has been examined closely was rather badly wrecked behind the Allied lines.

The only clue as to the identity of the machine appears to be that it was marked "H. W.," which initials are variously interpreted as "Halberstadt Werke" and "Hannover Werke." The description given herewith, obtained from a recent issue of *Flight* and *L'Aerophile,* will no doubt be later supplemented with more complete information.

A reconstruction of the H.W. biplane has been attempted, based on the wreckage of one of these machines brought down on the French front, where it was badly burnt. This reconstruction takes the form shown in the accompanying sketch. The H.W. biplane is a two-seater. The span of the upper wings is approximately 11 metres, and of the bottom wings about 10 metres. The wings have a dihedral angle but no sweep-back, and are staggered. The upper wings are of trapezoidal plan form with balanced *ailerons,* the trailing edge of which is extended, giving somewhat the appearance of the old Taubes. The lower wings are also of trapezoidal plan form, but







THE "H.W." BIPLANE

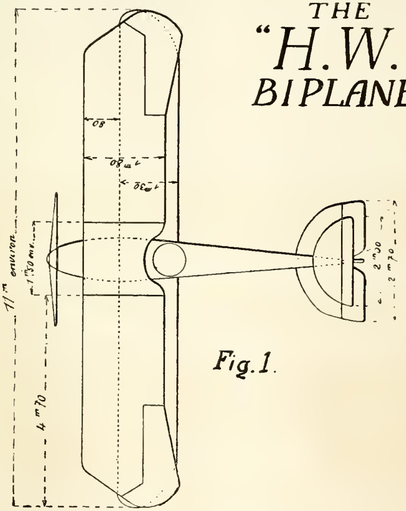


Fig. 1.

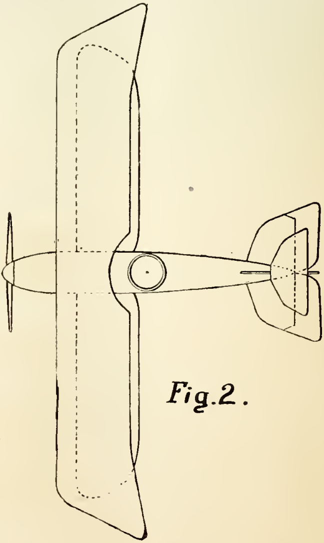


Fig. 2.

have the rear corners rounded off.

On each side of the *fuselage* there is one pair of inter-plane struts, sloping forward in conformity with the stagger and also sloping outward as shown in the front view. These struts are in the form of stream-line steel tubes.

The tail is of the biplane form, the top plane of it being considerably smaller than the bottom one. We have already indicated the armament: two machine guns, one in front and one behind. We may add that certain machines of this type have been fitted with bomb racks, while another was equipped with a camera. This is natural as the machine belongs to the C class (general utility). The accompanying sketches illustrate the differences between the different versions.

The plan form of the wings is almost definitely determined, but the *ailerons,* which have rounded tips in the diagrammatic reconstruction, come to a point in the sketch drawn by Lieut. Mussat. In the first case the tail plane is rounded and the fin and rudder of polygonal contour. The contrary is indicated in the letter from *Flight's* correspondent, who says: "I insist in particular on the following points: The *fuselage* is very deep, and the top plane is very close to it. The contour of the rudder and its fin is very rounded and *not* polygonal as in the reconstructed view. The tail planes are polygonal in plan view, with the angles rounded off."

In reconstructing the machine the length of each top wing was found to be 4 metres 70 from root to tip. The span found for the bottom wing was in the neighborhood of 11 metres, and as, according to all the observers who have had an opportunity of seeing the machine, the bottom plane was of smaller span than the top one, it was concluded that there must have been a fixed centre section in the top plane. No trace has, however, been found of such a centre section.

Flight's correspondent calls attention to the deep *fuselage* close to which is the top plane. On the other hand a contributor, Jean Lagorgette, who, from the hospital, follows closely any novelties, advances the following hypothesis: If there was a fixed centre section it would probably be made of steel tubes, and in that case have survived the flames. If no trace has been found of it or of its *cabane* this centre section does not exist, and the top wings attach directly to the bodv as in the Roland.

In any case, the *fuselage* being high, the rear gunner would be able to fire upwards. According to observers on the ground this machine is very fast and has a high "ceiling."

THE PFALZ SINGLE-SEATER FIGHTER

Among the more recent German single-seater fighters there is one which up to the present has received little attention, although it is employed to a considerable extent by the enemy. We are referring to the Pfalz scout, of which *Flight* published a brief description in a recent issue, by the courtesy of the authorities.

In outward appearance the Pfalz scout is chiefly remarkable on account of the fact that it imitates as do the recent Albatros scouts, the wing bracing originated by the Nieuport firm, incorporating a larger top plane and a smaller lower plane. The type is frequently termed by the Germans a one-and-a-half plane. The wing bracing differs, as regards the inter-plane struts, from that of the later type Albatros single-seaters in that the lower ends of the struts do not meet at a point, but are connected by a short horizontal member. The lower plane has two spars according to usual practice, although these are placed rather close together, thus forming in reality a compromise between the single-spar lower plane of small chord and the ordinary two-spar lower plane with chord equal to that of the top plane.

The Pfalz follows Albatros practice in that the upper wing runs right through, and is in one piece. This construction is possible on account of the fact that no dihedral angle is given to the wings. The top plane is mounted on struts sloping outward from the body.

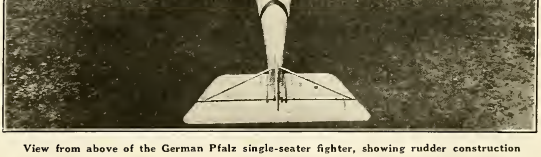
The attachment of the lower wing to the body is interesting. Instead of the attachment usually found there is on the Pfalz scout a short wing root, built integrally with the body, to which the lower spars are secured. In order to attain this the three-ply covering of the body has a reflex curvature at this point, from the convex curve of the body to a concave curve gradually merging into the shape of the wing section. There can be little doubt that this has been done in order to minimize resistance, but whether or not it achieves this purpose to any considerable degree may perhaps be open to doubt.

The body of the Pfalz single-seater is of elliptical cross section and appears to be of comparatively good stream-line form. It is deep so as to allow only just the top of the pilot's head to project outside, and to bring the top plane down low so as to obstruct the view to a lesser extent. It is narrow so as to allow the pilot a good view downward, the narrow overall width being rendered possible by the adoption of the semi-monocoque construction.

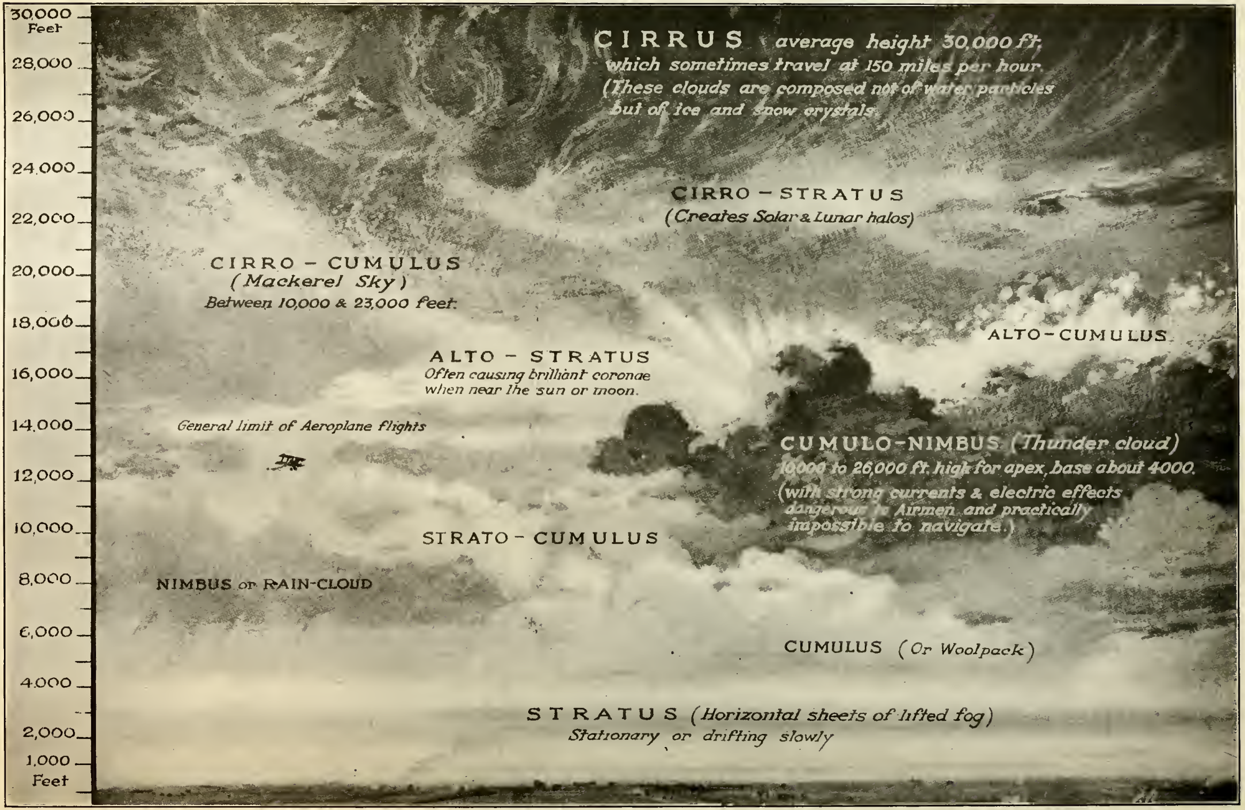
Although being in general principle similar to the Albatros construction the body of the Pfalz differs somewhat in the manner of applying the ply-wood covering. Whereas that of the Albatros is put on in short rectangular sections, each covering only one span between adjacent body formers, the covering of the Pfalz is in the form of two thicknesses of three-ply, each in the form of long narrow strips put on diagonally, the strips of the inner skin and those of the outer running at approximately right angles to one another. It would appear that this form of construction is of some advantage, inasmuch as difficulty is always experienced in getting three-ply wood to bend to a double curvature. A sheet of three-ply may be readily bent along one axis, but even a very thin sheet will protest if one tries to bend it in addition along an axis at right angles to the former. The fact is, therefore, almost certainly at the bottom of the Pfalz construction. However, this is a subject to which we hope to return later.

To the casual observer the tail planes of the Pfalz do not present anything of particular interest, but a closer examination reveals the fact that the tail plane appears to be put on "the wrong way round." That is to say, it has a flat top surface and a convex bottom surface. As far as is possible to judge from a somewhat hurried inspection, the tail plane is not set at any angle of incidence to the line of flight—either positive or negative—and one would therefore rather expect that during a steep dive the tail plane would exert a somewhat excessive righting force tending to "flatten out" the machine rather abruptly. This is so unusual in a German machine, where frequently the tail plane is set at a positive angle of lift, as to give food for some speculation.

The engine fitted to the Pfalz scout in question is a 160 h.p. Mercedes, which, as the accompanying photographs show, is neatly covered in with the exception of the extreme top of the cylinders. We have at the moment no figures regarding performance, but in view of the evident low resistance of the body the speed may safely be assumed to be fairly good.



View from above of the German Pfalz single-seater fighter, showing rudder construction


30,000 Feet
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
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2,000
1,000 Feet
CIRRUS average height 30,000 ft. which sometimes travel at 150 miles per hour.
(These clouds are composed not of water particles but of ice and snow crystals.)
CIRRO-STRATUS
(Creates Solar & Lunar halos)
CIRRO-CUMULUS
(Mackerel Sky)
Between 10,000 & 23,000 feet.
ALTO-CUMULUS
ALTO-STRATUS
Often causing brilliant coronae when near the sun or moon.
General limit of Aeroplane flights
CUMULO-NIMBUS (Thunder cloud)
10,000 to 26,000 ft. high for apex, base about 4000.
(with strong currents & electric effects dangerous to Airmen and practically impossible to navigate.)
STRATO-CUMULUS
NIMBUS or RAIN-CLOUD
CUMULUS (Or Woolpack)
STRATUS (Horizontal sheets of lifted fog)
Stationary or drifting slowly

PROBLEMS TO BE SOLVED TO SUCCESSFULLY OPERATE AIRCRAFT ON SCHEDULE TIME BETWEEN POINTS OF DEPARTURE AND TERMINAL

THE military authorities in charge of the Aerial mail lines, together with the Postal authorities and the Aero Club of America officials have held a number of conferences to define the problems to be solved and the possible way of solving them.

When the aerial mail line started there was no data available regarding meteorological conditions and the ways and means of overcoming the difficulties created by changing weather conditions.

The following authorities participated in the various conferences:

Captain Charles Andrew Willoughby, A. S. S. C., in charge of the Aerial Mail Service for the Army; Captain B. B. Lipsner, of the Lubrication Division, Department of Aeronautics, U. S. Army; Second Assistant Postmaster General Otto Praeger, Louis C. Boldenweck, superintendent of the Aerial Mail Service; Alan R. Hawley, President, and Henry Woodhouse, Member of the Board of Governors, Aero Club of America; Augustus Post, Secretary, Aerial League of America; Lieut. Torry H. Webb, Lieut. Paul Culver, Lieut. C. H. Miller, Lieut. James C. Edgerton, Lieut. Steven Bonsal, Lieut. J. Kilgore, Richard Vreeland, Assistant Superintendent of Mails, of New York; George L. Conner, Chief Clerk to Mr. Praeger; and Mr. Harry L. Hartung, representative of the Post Office Department at Belmont Park; Professor Charles Lane Poor, and Captain Robert A. Bartlett.

We printed in the last issue the outline of the problems to be solved to successfully operate aircraft on schedule time between points of departure and terminal. We print herewith the table of weather conditions during the first month of Aerial Mail Service prepared by Mr. Boldenweck, the Superintendent of the Aerial Mail Service.

No. 1—Conditions en route Philadelphia from Washington, D.C.
No. 2—Conditions en route Washington, D.C. from Philadelphia

Month	Pilot	Fair	Fog	Wind	Storm
May 15	1 Boyle	Clear		N NE 8 Mi.	
	2 Edgerton	Clear		N NE 8 Mi.	
16	1 Edgerton x	Clear		E Light	
	2 Edgerton x	Clear		E Light	
17	1 Boyle	Clear		E to SE Light	
	2 Miller	Clear		E to SE Light	
18	1 Miller	Clear		S Light	
	2 Culver	Clear		S Light	
20	1 Edgerton	Cloudy		S SW Light	
	2 Miller	Partly cloudy		S Light	
21	1 Miller	Cloudy		S Light	Showers
	2 Edgerton	Clouds		S Light	Electric storms
22	1 Culver	Light haze		SE 8 Mi.	Showers
	2 N. F.	Clouds		S SE 30 Mi.	Showers
23	1 Edgerton	Clouds	Light fog	S SE 30 Mi.	Light showers
	2 Miller	Clouds		S SE 25 Mi.	Light showers
24	1 Miller	Clouds		SE 25 Mi.	Showers
	2 Edgerton	Light haze		S SE 25 Mi.	
25	1 Killgore	Haze		S Light	
	2 Miller	Partly cloudy		S Light	Light showers
27	1 Edgerton	Clouds	Heavy fog	S Light	Showers
	2 Killgore	Clouds	Heavy fog	S Light	Showers
28	1 Miller	Clear		S SW 8 Mi.	
	2 Edgerton	Partly cloudy		S Light	
29	1 Killgore	Light haze		S E Light	
	2 Culver	Partly cloudy		S SE Light	
30	1 N. F.	Clouds	Heavy fog	S Light	
	2 N. F.	Partly cloudy	Light and heavy fogs	S Light SE	
31	1 Culver	Clouds	Light fog	S SE Light	
	2 N. F.	Clouds	Light fog	S Light	Showers
June 1	1 Edgerton x	Clouds	Light fog	S SE Light	Showers
	2 Edgerton x	Partly cloudy		S Light	Showers
3	1 Edgerton	Light haze		SE Light	
	2 Bonsal	Clouds		S Light	
4	1 Bonsal	Clear		SE Light	
	2 Edgerton	Clear		SE Light	
5	1 Edgerton	Haze		S SW Light	
	2 Killgore	Clear		S Light	
6	1 Edgerton	Low haze		W Light	
	2 Bonsal	Clear		W Light	
7	1 Killgore	Clouds		SW Light	Showers
	2 Edgerton	Clouds	Low fog	SW 15 Mi.	Showers
8	1 Bonsal	Clear		NE 15 Mi.	
	2 Killgore	Clear		N NE 15 Mi.	
10	1 Edgerton	Partly cloudy		S SW 10 Mi.	
	2 Bonsal	Partly cloudy		S SW 10 Mi.	
11	1 Killgore	Cloudy		SE Light	
	2 Edgerton	Partly cloudy		E Light	
12	1 Bonsal			S SW 25 Mi.	
	2 Killgore	Clouds		SW 25 Mi.	
13	1 Edgerton	Light haze		NW 25 Mi.	
	2 Bonsal	Clear		NW 30 Mi.	
14	1 Killgore	Cloudy		NE 15 Mi.	
	2 Edgerton	Partly cloudy		NW W Light	
15	1 Bonsal	Clear		SW Light	
	2 Killgore	Clear		N NW Light	

x—Round trip.
N. F.—No flight.

No. 1—Conditions en route Philadelphia from New York.
No. 2—Conditions en route New York from Philadelphia.

Month	Pilot	Fair	Fog	Wind	Storm
May 15	1 Webb	Clear		NE E 8 Mi.	
	2 Culver	Clear		E NE 8 Mi.	
16	1 Bonsal	Haze, light		E Light	
	2 Webb	Clear		SE Light	
17	1 Culver	Light, haze		S Light	
	2 Webb			S SE Light	
18	1 Bonsal x	Clear		E Light	
	2 Bonsal x	Clear		E SE Light	
20	1 Webb x	Hazy		South, strong	
	2 Webb x	Light clouds		South, light	
21	1 Bonsal	Clouds	Thick	SW Light	Electric storms
	2 N. F.	Clouds		S Light	Electric storms
22	1 Bonsal (Returned)	Clouds	Thick	S to SE Light	
	2 N. F.	Clouds		S Light	Showers
23	1 Bonsal	Haze and fog		S SW Light	
	2 Bonsal	Cloudy		S Light	Light showers
24	1 Webb	Light haze		S SE 8 Mi.	
	2 Culver	Light haze		S 10 Mi.	
25	1 Bonsal x	Light haze		S Light	
	2 Bonsal x	Partly cloudy		S Light	
27	1 N. F.	Clouds	Thick	S Light	Light showers
	2 Webb	Clouds	Fog low	S SW Light	Showers
28	1 Bonsal	Clouds		W with squals	Showers
	2 Miller	Clouds		SW Light	
29	1 Bonsal	Clear		NE E Light	
	2 Miller	Clear		E Light	
30	1 N. F.	Clear	On coast,	NE Strong	
	2 N. F.	Partly cloudy	Thick clouds	E Light	
31	1 N. F.	Cloudy	Thick fog on coast	S Light	Light showers
	2 N. F.	Cloudy	Low fog	S Light	Showers
June 1	1 N. F.	Haze		SW Light	
	2 Killgore	Cloudy		S Light	
3	1 Miller	Light haze		NW Light	
	2 Culver	Clouds		W Light	
4	1 Killgore	Haze		W Rough	
	2 Miller	Clear		SW Light	
5	1 Webb x	Low haze		W Light	
	2 Webb x	Clear		W Light	
6	1 Miller	Low haze		S SW Light	
	2 Culver	Clear		S SW Light	
7	1 N. F.	Clouds	Low fog	SW 24 Mi.	Thunder show.
	2 N. F.	Clouds	Low fog	SW 24 Mi.	Thunder show.
8	1 Culver	Clear		NE 25 Mi.	
	2 Miller	Clear		NE 25 Mi.	
10	1 Miller	Partly cloudy		SW to W 8 Mi.	Thunder show.
	2 Culver	Partly cloudy		SW to W 10 Mi.	
11	1 Miller	Clear		NE E Light	
	2 Miller	Clear		E Light	
12	1 Culver	Clouds, light haze		W 35-40 Mi.	Rain
	2 Culver	Clouds		W 35 Mi.	Showers
13	1 Webb	Clear		NW 45 Mi.	
	2 Webb	Clear		N NW 30 Mi.	
14	1 Webb	Light haze		N Light	
	2 Webb	Clear		N NW Light	
15	1 Miller	Light haze		N NW 10 Mi.	
	2 Miller	Clear		NW 10 Mi.	

x—Round trip.
N. F.—No flight.

HIGH FLYING AND THE HEIGHT OF VARIOUS TYPES OF CLOUD

The height at which clouds are riding on any particular day is of the greatest interest and importance to the air pilot. When he looks out at the sky in the early morning his estimation of the conditions which meet his eye will be qualified by the work which lies before him. If his work is direct downward observation and photographic record taking he will not mind very much the cloudy or misty appearance in the distance; but if artillery spotting is the order of the day, his opinion of the weather will be uncomplimentary, for that haziness will prevent proper observation. If the work consists of a long-distance raid he will look for different conditions. Sometimes the presence of cloud at a low altitude is useful as a screen or shelter to which to fly. In the above cloud diagram we see stratus, which may be otherwise described as horizontal sheets of lifted fog, at 2,000 ft. Above is some cumulus, or woolpack cloud at 5,000 ft. At 8,000 ft. is some nimbus, or rain cloud. At 10,000 ft. is some strato-cumulus. At 12,000 ft, is a mass of Cumulo-nimbus, dangerous to aerial navigators. Still higher is some alto-stratus, and still higher, at 20,000 ft., is the cirro-cumulus, which causes what is known as the mackerel sky. The two highest types of cloud are the cirro-stratus and the cirrus, composed of ice particles. It will be seen from the above that the aerial ocean which aviators navigate is of very varied character in its different layers. It is a much more variable and subtle medium than the ocean of water.

The drawing illustrating different cloud formations published on the opposite page is reproduced by courtesy of the *London Sphere*.

NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Dallas, Tex.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Note 1—Report to points named in order mentioned for temporary duty.

Note 2—Report to Lyles, Tenn., take station and wire D. M. A.

Note 3—Report to Waltham, Mass., take ation and wire District Approvals Officer, 480 Lexington Ave., New York.

Note 4—Report to Eastman Kodak Co., Rochester, N. Y.

Note 5—Report to Middleton, Pa., Aviation Gen. Supply Depot.

Note 6—Report to Officer i/c Production Dept., Grand Central Palace, 46th Street and Lexington Ave.

Note 7—Report to District Manager of Equipment, Chicago, Ill.

Note 8—Report to Fort Kamehameha, Honolulu, Hawaii.

Note 9—Report to Radio School, Austin, Texas.

Note 10—Report to Signal Corps Recruit Depot, Fort Wayne, Mich.

Note 11—Report to Aerial Mail Station, Bustleton, Pa., and wire D. M. A.

Note 12—Report to Swissville, Pa., Union Switch and Signal Co.

Special Orders, Nos. 142-146, Inclusive

A

Ainsworth, Cyril	FRF
Adams, Cedric S	GLC
Asp, Melvin B	FRF
Anderson, Edwin F	BST
Adams, John F	CGC
Alton, Darrell D	EOT
Abel, W. E	BST
Ainslee, James E	FLT; SMM; FRF
Anderson, Lee N	VBW
Anderson, Harry William	SLR; PFO
Alexander, Robert P	FRF
Abernathy, Claude S	FRF

B

Buell, Harry G	HHN; SRC; Note 1
Barnard, Albert	FRF
Berg, Carl Leslie	SLR; KST
Burns, Edward	DMA
Bisgood, Frederick W	FRF
Bagnell, Edgar W	EOT
Brugman, William J	VBW
Blackburn, Ernest W	FOB
Bartlett, Charles O	SAG
Bishop, Albert B	CWT
Bassford, Curtis A	FRF
Biggs, Frederick P	FRF
Baxter, Robert K	FRF
Bird, Byron	VBW
Boyle, Robert D	FRF
Brown, Cyrus P	FRF
Baker, Harry S	BST
Brokaw, John A	PFO
Bruch, Louis M	PFO
Bowman, Charles Elmo	SLR; ELA
Bell, Robert W	PFO
Burr, Walter A	PFO
Barnard, Albert	BST
Brown, Harold L	FRF
Brown, Ralph E	PFO
Broms, Clarence S	PFO
Bruner, Donald L	EOT
Barnes, Robert H	BST
Baum, Frank H	LHV
Barkelow, Samuel W	CGC
Black, Howard	BST
Burke, George W	FRF
Bach, Albert	EOT
Barlsdale, Julian N., Jr	EOT
Brown, Egbert D	CGC
Begeman, Myron L	BST
Brown, Henry J	FRF
Barnhart, Leroy W	SLR; AAD
Boyce, William Henry	REV
Bernard, Clifford S	FRF
Brown, Raymond J	PFO
Boos, Walter Percy	SLR; AAD
Beau, Lucas V., Jr	SLR; AAD
Batty, John H	FRF
Balsley, Horace C	FRF
Bowen, Joseph Brown	SLR
Bassford, Curtis A	SMM
Bailey, John Madison	SLR
Babcock, Henry S	SLR; FRF; DIK
Bouquet, Uric L	FLT; SMM; FRF
Baker, Harold H	FRF
Brunner, Charles F	LHV

Bruhaker, Lawrence	FLT; SMM; FRF
Burger, Fairfax Carter	SLR; AAD
Budd, Denison Merrill	SLR; LDT
Brew, George Joseph	FLR
Braymen, Kenneth C	FRF
Blewett, Gideon Alhert	SLR; KST
Burnard, Norman Thomas	SLR; LDT
Boxell, Earl E	FRF
Brennan, John Patrick	SLR
Burns, John Vernon	SLR
Bahcock	Note 8
Boehm, Herbert L	Note 3
Bernhard, William	Note 10

C

Cronin, George H	SLR
Camphell, David S	VBW
Cole, Harold D	FRF
Crane, Percy F	VBW
Cochrane, Earl C	FRF
Conner, Richard M	FRF
Conlogue, John A	FRF
Cooper, Ralph E	FOB
Cutler, Sewall	DMA
Clark, Walter D	FRF
Cheney, Christopher A	DMA
Cabell, Philip F	FRF
Cook, Ray C	FRF
Clark, William H	FRF
Chester, Andrew E	FRF
Clemmey, Francis W	VBW
Cornell, George C	FRF
Cutler, Harvey D	FRF
Cathcart, Donald G	FRF
Callis, Louis E	FRF
Campion, John L	CGC
Colliver, Harry F	FRF
Cartwright, Paul	FRF
Carroll, John J	VBW
Clark, Ralph S	CGC
Coleman, Wiley L	CGC
Conway, Cornelius M	LHV
Chamherlain, Leo W	FRF
Cook, William L. S	PFO
Crook, Wilson W	PFO
Chapman, George H	CGC
Claxton, Willis L	CGC
Canfield, Donald T	SBI
Carson, William L	FRF
Conrad, Max H	FRF
Clark, Roger P	CGC
Clark, Arthur T	BST
Colvin, Arthur D	FRF
Clarke, Clinton W	FRF
Corkins, Vernon G	GLC
Clark, Earland F	LHV
Costar, Lloyd	PFO
Corbet, Clinton L	PFO
Clinton, Amhrose Victor	SLR
Caldwell, Wally S	VBW
Clark, Willard S	FRF
Clark, Eugene C	FRF
Campbell, Max W	KST
Cox, Sidney H	KST
Collier, Ralph P	BST
Cowgill, John R	KST
Cooper, Forrest G	DIK
Cooper, Edwin G	FRF
Collins, Claude R	FRF
Coyle, Walter W	FRF
Croom, Marvin E	BST
Crompton, Howard	FRF
Crow, Homer L	SLR; AAD
Carrigan, Joseph Francis	SLR; PFO
Chambers, Karl Dumas	SLR; RWT
Cowen, Thomas David	SLR; CSO
Cunnea, Louis James	SLR; EOT
Calhoun, William Morgan	SLR; EOT
Collier, Henry L., Jr	FRF
Chapman, Harold C	FRF
Croarkin, Paul Cornelius	SLR; RWT
Chaplin, Winthrop L	FRF
Charroin, Arthur B	FRF
Clark, Horace	FRF
Clark, Oliver L	FRF
Camblin, Roy W	FRF
Cantey, Samuel McGowan	FRF
Chase, Leo	SLR
Cowham, Robert N	DMA; WFO; Notes 1, 4
Crowdus, Walter C	Note 8
Canfield, John P	Note 8

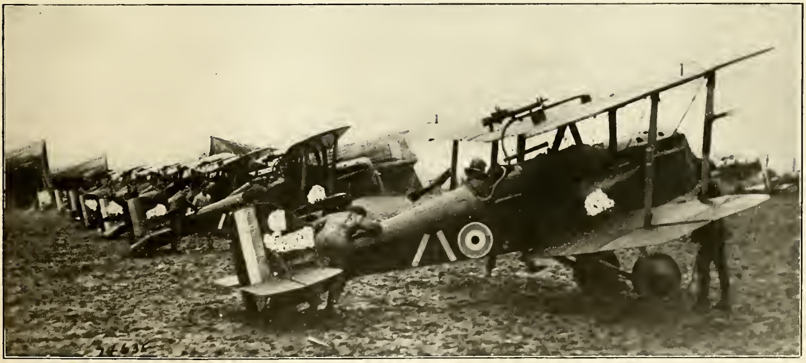
The Commanding Officer of the Signal Corps Aviation School at Columbia, and his Staff. Captain Joseph Sears, the Commanding Officer, is shown in the center foreground

D

Dake, Robert E	FRF
Daniels, Julian S	FRF
D'Hodge, Wylie F	FRF
Dresser, Burtis Eugene	SLR
Dixon, Rollin Lester	SLR; LHV
Despain, Lawrence N	FRF
Dreher, Raymond Carl	SLR; LDT
Davis, Robert H	VBW
Drueding, Alhert J	DMA
Davis, Claude A	FRF
Drake, Joseph H., Jr	FRF
Dreher Raymond C	FRF
Dayton, Frank E	FRF
Duffy, James W., Jr	CGC
Diller, Harry J	CGC
Davis, Charles W	BST
Despain, Lawrence N	PFO
d'Autremont, Hubert H	LHV
DeLany, Russell W	FRF
Duncan, Lee J	DIK
Day, Robert Goss	SLR; AAD
Daniel, Lloyd A	FRF
Dorris, William L., Jr	FRF
Doherty, Chester C	FRF
Dutkewich, Meletius Peter	SLT
Daley, Henry Francis	SLR
Doerr, Henry David	SLR

E

Elliott, Park	CRI
Elliott, Douglas S	CGC
Elliott, Clinton, Jr	EOT
Edwards, Duncan L	PFO
Ehy, Allen D	SLT; FRF; SMM



British Official from Kadel & Herbert, N. Y.

BRITISH AEROPLANE BASE ON THE WESTERN FRONT

At this particular British base over 100 British aeroplanes are stored. They are here seen about to leave the ground for a raid on the Hun lines. The white spots seen scratched out were taken out by the censor as they showed the particular units to which these aeroplanes belonged

Before starting out on a bombing raid into the enemy's country. Serving out the Bombers machine gun at the "Gunroom" of an aerodrome. This is primarily for use against enemy airmen. (Official Photos)

Enloe, Robert	BST
Egelkraut, Edwin H	BST
Ewing, Henry G	PFO
Elhart, Earl W	FRF
Eagley, Karl Chase	SLR

F

Fraser, Walter	FRF
Ford, Lewis Eastman	SLR; LDT; FRF
Fuller, Clifford J	DMA
Fulton, Frank F	VBW
Fowler, Gordon	FRF
Field, Edward M., Jr	SLR
Fredlund, Frederick A	BST
Fromberg, William R	BST
Frost, Horace W	DMA
Finter, Clyde V	FLT; FRF; SMM
Faircloth, Edward C	CGC
Furman, Earl F	EOT
Foster, Henry B., Jr	CGC
Farthing, Welbourne O	FRF
Fowler, Louis F	FRF
Fickel, Jacob E	FRF
Flamman, John W	KST
Franklin, Charles B	KST
Foster, Lindsay B	SLR; AAD
Flachsenhar, Walter R	FRF
Flournoy, William Raymond	SLR; KST
Foster, Robert Hiram	SLR; PMT
Fenwick, Herbert F	FRF
Finn, Matthew E	FRF
Franklin, Roger	SLR; CRI
Finlay, William Pound	SLR
Ferree, David Scott	SLR
Foster, William John, Jr	SLR
Farnam, Julian P	Note 12

G

Gary, Will K	FRF
Gay, Ralph Ebey	SLR; FRF
Graham, Harland Brown	SLR; KST; FRF
Gandy, Robert L	EOT
Goodstein, David M	EOT
Gravely, William S	FLT; FRF; SMM
Gardner, Fred E	FRF
Green, Guy W	CGC
Goodsell, Odgen M	PFO
Garrison, Glenn G	FRF
Gary, Winder	EOT
Granger, Herman H	LDT
Gorrill, Irvan A	KST
Garrison, George G	FLR; SMM
Garesche, Edmond A	SLR; AAD
Green, Lew Abrams	SLR; RSD
Grantham, Harry Newton	SLR; RWT
Gilpin, Clifford Ernest	SLR; LDT
Green, Dwight H	FRF
Goree, Rogers Campbell	SLR; ELA
Gleerup, William W	FRF
Gassaway, Crosby Mitchell	SLR
Griswold, Clifford B	Note 6

H

Hanlon, William Jones	SLR
Harbage, Homer Benjamin	SLR; TFT; FRF
Hart, Jabez Waterman	SLR; FRF
Hartman, Clarence Arthur	SLR; FRF
Hartt, Obder Raymond	SLR
Hastings, Edward Rogers	SLR
Hickey, Frederick J	VBW
Huttig, William, Jr	FRF
Horton, Elwood	FRF
Hunt, Ralph Van Nice	SLR
Heizmann, William Albert	CPR; DMA
Heaney, Francis Clifford	SLR; ELA
Hall, George Linwood	SLR; FRF
Hinckley, Nelson Crosby	FRF
Henderson, Charles I	SBI
Henley, Harold B	VBW
Hopkins, Ward D	FRF
Hering, Coates P	DIS
Hussey, Clyde L	SLR
Hall, Clarence E	DMA
Haines, Charles H	FRF
Henderson, John S	FRF
Howard, Lynn F	FRF
Hartman, Henry B	FRF
Hardesty, Francis J	FLT; SMM; FRF
Harshaw, Myron T	FLT; SMM; FRF
Hastey, Thomas W	FLT; SMM; FRF
Harrison, Travis L	CGC
Hall, Levi M	CGC
Huffman, Charles B	TMA
Hunt, Baron L	PMT
Hovey, Justus A	FRF
Henderson, Paul R	PFO
Harvey, Robert B	FRF
Hitchcock, William C	FRF
Hewitt, Robert P	FRF
Holtzworth, Charles C	VBW
Hadley, Lawrence B	BST
Howe, Lawrence L	EOT
Harris, Benjamin T	FRF
Hogel, Milton H., Jr	DIK
Harris, Frederick R	CGC
Hill, Glenn R	CGC
Hubner, George H	CGC
Holway, Lowell H	DIK
Hands, Stanley M	BST
Hassett, Emmett A	CGC
Haller, Hubert G	VBW
Hamilton, John R	PFO
Helmerich, Walter H., Jr	PFO
Hale, John Tull	SLR; PMT
Healey, Michael V	FRF
Holloman, Barrett W	FRF
Hollander, Robert Bertram	SLR; RWT
Holmes, Raymond M	FRF
Hayes, Leslie E	FRF
Haggerty, Lyman H	FRF
Humphrey, David Edward	SLR; LDT
Healy, James A	FLR
Heffley, Armor Simpson	SLR
Howard, Robert Burnham	SLR
Hoffhaus, Henry B	Note 9

I

Isbell, Charles Woodruff	SLR
Irvine, William D	DMA
Ingraham, Elmer C	FRF
Inglesby, Joseph E., Jr	CGC
Innes, William W	LHV
Ingraham, Forrest W	FRF

J

Justice, Philip Syng	SLR; CRI; FRF
Jacobs, John Frank	SLR; KST
Jones, Vivian Maxwell	SLR; CAF
Jackson, Le Ross	SLR; DMA
Johnson, Courtlandt Spencer	SLR
Jones, Howard H	FRF
Johnson, Harry A	FRF
Jennings, George A	FLT; DIK
Jones, Ira M	FRF
Junkins, Albert S	BFT
Jolly, John C	KST
Jacobi, George N	EOT
James, John R	EOT
Jacobs, George S	FRF
Jaggard, Robert K	FRF
Johnson, Perry V	FRF
Jurden, Leonard W	FRF

K

Kennedy, William E	PFO
Kennedy, Carl E	BST
Kennedy, Robert E	FRF
Kerr, George R	VBW
Kraus, Edwin Joseph	SLR; FRF; DIK
Knox, Merton H	FRF
Kaufman, Emory B	BST
Kraft, Lawrence Fenton	SLR
Kinnebrew, Edward R	FRF; DIK
Kelly, William H	FRF
Kelly, John K	SLT; FRF; SMM
Kidder, Henry P	FRF
Kinder, Roland H	FRF
Knupp, Glenn H	BST
Kuhn, Herbert R	BST
Kober, Edgar I	CGC
Kern, Edward E	FRF
Kelbaugh, Charles H	KST
Knowlton, George E., Jr	FLT; FRF; SMM
Kear, Charles E	CGC
Kelcey, George C	EOT
Kiely, Daniel	SLR; EOT
Kimball, Francis N	FRF
Kenney, Cornelius J	FRF
Kinnebrew, Edward Robert	SLR
Keause, James W	DAP

L

Lindley, Stacey B	VBW
Logel, Joseph F	FRF
Long, William F	DAP
Lewis, Hobart H	FRF
Lyon, James L	SLR; FRF
Lowell, James R	VBW
Lyle, Fred B	CGC
Lister, Harold Reid	SLR; RWT
Luddy, Joseph Ladimore	SLR; DIK
Lewis, Chauncey G	VBW
Linkenhofer, Robert E	SLR
Lamb, Howard E	FLT; SMM; FRF
Lowenstein, Milton D	FRF
Lord, Devereux	VBW
Lull, Linford C	GLC
Lyford, Charles C	KST
Littlefield, Robert C	PFO
Lynch, Frederick D	LHV
Lane, Herbert V	EOT
Lansing, Jack C	PFO
Loughary, Ivan H	VBW
Lowe, Robert E	RWT
Lewis, Orman J	EOT
Lewis, James Otis	SLR; KST
Lowe, Herman J	FRF
Lund, Paul S	FRF
Lawson, Harry E	FRF
Lynch, Virgil Reges	SLR; Note 7

Mc

McQuown, William Karl	FLR
McCally, LaRue	SLT; SMM
McCuiston, Edward T	FRF
McCarter, Erwin L	CWT
McLaurin, King H	DMA
McKay, John Graham	SLR; FOB
McHugo, Jack R	FRF
McNeil, Guy L	BST
McCall, Ross L	FRF
McBain, Bruce	BST
MacLaughlin, Thomas G	PFO
MacMechan, Dunbar D	FRF
McEllhinney, Ralph Lamont	SLR; KST
MacEnroe, John W	CGC
MacKenzie, Clifford R	DIK
MacKenzie, Hugh F	SLR; AAD
McCarron, Henry A	FRF
McGehee, Leo Raymond	SLR; CRI
McNabb, Harold Robert	SLR; CRI
McCall, Austin J	Note

M

Millard, Joseph Hopkins	SLR; ELA
Metcalfe, John W	FRF
Massey, Bert V	DIK
Moreton, Amos Leon	SLR; FRF; AAD
Milyard, Raymond Calvin	SLR; LDT
Morris, Joseph T	HHN
Morris, Julian B	EOT
Moore, Herve C	FRF
Midkiff, Robert F	FRF
Muckley, Robert L	BST
Mason, Chauncey C	BST
Morey, Philip J	FRF
Manzelman, Earle Henry	SLR; RSD
Midcap, Clarence Lloyd	FLT; SMM; FRF
Meacham, Jerome F. B	GLC
Mills, Robert R	FRF
Marrs, Aubrey R	FRF
Middleton, Mortimer	FRF
Meeks, Charles C	CGC
Mitchell, Oliver F	FRF
Miller, Floyd I	KST
Middleton, Irvin B	SLR; AAD
Martin, William J., Jr	KST
Merrill, Clyde H	SLR; FRF; DIK
Mulcahey, Edward P	EOT
Miller, Marion L	BST
Mahler, James B	SLR; AAD
Miller, Ray Edward	SLR; CRI
Mayo, Francis Peltier	SLR; RWT
Merrick, Ward Sprague	SLR; CRI
Macauley, Alexander Vernon	SLR; AAD

Miller, Chauncey Stevens	SLR; RWT
Morris, Charles G	FRF
Milyard, Raymond C	FRF
Mesnier, Edward S	FRF
Mayer, Arthur C	FRF
Martin, Milton Rex	SLR; KST
Manley, Henry Sackett	SLR; CRI
Miller, Robert Lee	SLR
Moffett, Ralph Charles	SLR
Miller, Dewel H	Note 5

N

Noble, Arthur W	FRF
Nash, Roland L	BST; FRF
Norwood, George M	FLT; FRF; SMM
Norton, Howard B	LHV
Nunenmacher, Francis W	PFO
Newsom, Albert S	SLR; FRF; DIK
Noyes, Charles Morgan	SLR; KST
Nordby, Julius Edward	SLR
Nelson, William T	Note 8

O

Orr, Harold E	FRF
O'Brien, Clarence R	VBW
O'Connor, Nicholas E	DAP
O'Briant, Conrad L	FRF
O'Brien, Frank McAllister	SLR; PMT
Oakley, Edward H	CAF
Orr, Dale	SLR
Owen, Ross G	FRF

P

Puhl, 'Gene P	FRF
Pardy, George W	FRF
Pratt, Harold C	VBW
Pearson, Wallace D	FRF
Patten, Ryder	DIS
Palmerlee, Joseph B	FLT; FRF; SMM
Page, Henry L	FRF
Poole, Harold Walter	SLR; CGC
Parker, Robert M	FRF
Price, Henry W	BST
Petrilli, John M	EOT
Poulin, John A	FRF
Potter, Justin S	FRF
Palmer, James Edwin	RSD; SLR
Perkins, Edward B	CFT
Peteler, Roland O	VBW
Pollard, Thomas G	FRF
Pittman, Wayne V	PMT
Pedler, Harry W	FRF
Patton, Edwin J	EOT
Phillips, Charles A	FRF
Pearson, Lawrence H	FRF
Porter, Victor W	FRF
Phillips, Lyman L	FRF
Peterson, Herbert Ferdinand	SLR; CRI
Pierson, Stanley Henry	SLR; CRI
Penfield, Charles C	FRF
Payne, Walter Tower	SLR; ELA
Pennefather, James Sheridan	FLR
Paynter, Henry Martyn, Jr	SLR
Prosser, Frank H., Jr	Note 8

Q

Quinnell, George C	FRF
Quinneen, Charles Foger	SLR; PFO

R

Rue, Lars	SLR; KST
Robertson, James B	FRF
Rossell, John E	ELA
Roos, Caril Natban	SLR
Rhine, Mel	SLR; FRF
Richardson, Herbert L	EOT
Heimerth, Charles H	CGC
Rogers, Henry Shelton	SLR; RWT
Ruggles, Daniel G	KST
Richards, Harrison H. C	FRF
Rock, Paul C	CGC
Ream, William R	FRF
Ray, Luke C	EOT
Russell, Franklin B	WFO
Ripperger, Clarence W	FRF; DIK; SLR
Rome, Robert C., Jr	SLR; FRF; PMT
Rose, Gamaliel S	PFO; CWT; EOT; Note 1
Rees, Lucius Gibson	SLR; KST
Robertson, George Albert S., Jr	FLR
Randell, High P	FRF
Reynolds, Leo F	FRF
Raible, Joseph C., Jr	FLR
Ringer, Albert Russell	SLR; ELA
Roe, James A., Jr	FRF
Reeves, Robert Hodd, Jr	SLR; CRI
Rideout, George R	FRF
Riecks, Frank C	FRF
Royal, James M	Note 12

S

Snarenberger, Burnis A	PFO
Snow, William J	EOT
Swaller, Sidney R	BST
Sandusky, Henry C	EOT
Stone, Thomas W	CGC
Stine, Harold B	PFO
Sine, Myron A	CGC
Sterck, Thomas	BST
Sands, Frank T	LHV
Shankle, Warren C	KST
Starkweather, Ralph	SLR; FRF; LDT
Snyder, Kenneth M	VBW
Szymanski, Sigmund	BST
Schenck, John Terhune	SLR; ELA
Sbillington, Waldo E	FRF
Sherry, Cameron B	FRF
Steinhauer, Louis E	LHV
Sims, Earl E	VBW
Schellenberg, Bert G	PFO
Schermerhorn, Samuel S. V	DMA
Schuler, George Frederick	SLR; KST
Shortley, Michael J	UTA
Shepherd, Robert A	FRF
Selden, James K	FRF
Seaver, Lloyd B	SLR; FRF
Shepherd, Herbert R	FRF
Schonberg, Eugene	SLR; VBW
Stetson, Philip C	FRF
Schmidt, Edgar A	BST
Smith, Leonard L	EOT
Summerfield, Vernon Douglas	SLR; KST
Smith, Ralpb Walter	SLR
Sloan, Harry	SLR
Sporlein, Louis Wolfgang	SLR
Stewart, James David	SLR
Slater, Joseph Marsden	SLR
Stout, Minor Woolfolk	SLR
Stodder, John David	SLR
Stone, Frank H	VBW
Saltsman, Irl L	FLR; SLR; SMM
Stearns, Earle D	EOT
Spainhour, Carl M	SLR; FRF
Sullivan, Dennis J. M	SLR; FRF; DIK
Silvermann, Michael M	SLR; DIK
Stedman, Livington B., Jr	FRF
Simpson, Walter H	VBW
Stegall, J. Rex	FRF
Stuart, George Dayton	SLR
Sears, Richard Willard	FLT
Sutter, Julius F	SLR; AAD
Shawhan, Romer	FLR
Smith, Albert D	FRF
Sinclair, William C	FRF
Shreve, Arthur Lee	SLR; KST

T

Thigpen, Arthur J	FRF
Thomas, Herbert L	BST
Ta.e, LeRoy H	EOT
Tomlinson, Kenneth C	LHV
Taylor, Lloyd J	BST
Templeton, John Wesley	SLR; KST; FRF
Thayer, Raymond H	FRF
Todd, Kirk W	GLC
Tinnerholm, Ivar E	FRF
Thierback, George Charles	SLR
Thornburg, David W	SLR; AAD
Turner, Wiley B	FRF
Thompson, Walter H	FRF
Tilden, George A	DIS
Taylor, John Albert	SLR; RWT
Talbot, Elmer Ralph	SLR; RWT
Tower, Robert Russell	SLR; KST

V

VanKirk, Russell M	BST
Valle, Paul	FRF
Van Inwegen, H. Barentsen	CGC

W

Walker, Charles C	CGC
Walton, John M	FRF
Williams, Paul K	FRF
Warren, Edward W	FRF
Wylie, John	LHV
Wagner, Ned F	VBW
Wissler, Frank E	VBW
Wagner, Emil T	FLT; FRF
Wall, Edward B	FRF
Waters, Leland L	EOT
Watkins, Kenneth	DMA
Ward, Peter C	DAF
Winants, Garret E	FRF
Wylie, Laurance	GLC
Wilkinson, William H	FOB
Warde, Arthur Frederique	SLR; RSD
White, Morris G	FRF
Wells, Everett D	FRF
Whittell, Alfred	RTR
Wilkeson, Livingston E	BST
Waltmate, Louie Frederick, Jr	SLR; KST
Williams, J	FRF
White, George M	CGC
Washburn, Edgar B	VBW
Wing, Charles R	BST
Wolf, John E	PFO
Watson, Oshorne S	FLT; DIK
Wallis, Edmund C	SLR; DIK; FRF
Williams, Raymond B	FLT; SMM
Winants, Garrett E	FLT; SMM
Whitehill, Millard F	SLR; FRF; TFT
Wells, Harold Raymond	FRF
Wells, Roe E	FRF
Worrell, Willard P	FRF
Walthal, LeRoy Allen	SLR; LDT; FRF
Watson, Hugh	FRF
Westenhaver, Robert A	SLR; CGC
Weisiger, Earl H	FRF
Winter, Henry Clarence	SLR
Wilbur, Jesse B	Note 6
Wood, Ivan D	Note 6
Wood, Seth F. A	Note 11
Watkins, Kenneth	Note 2

Y

Young, Bentley	FLT; FRF; SMM
Yocum, Reuben J	LHV
Ya es, Reginald L	KST
Youngs, Grover A	SLR; KST
Young, Ernest H	FRF
Yo.k, Duke Alexander	SLR; RWT

Z

Zander, William E	FRF
Zane, Robert Theodore	SLR; KST

British aeroplane being loaded with bombs previous to a raid into the enemy's country. Bombs are seen here being placed under the machine

The accompanying photograph shows the trapshooting grounds of the U. S. Army School of Military Aeronautics at the University of Illinois, Urbana, Ill. Some of the aviator cadets are learning to shoot clay targets under the instructions of Mr. W. D. Stannard and Mr. Harry Gill.
Traps have been installed at all aviator camps. The government thus officially recognizes the value of a knowledge of trapshooting to the men who are training for this branch of the service. An important part of their work will be shooting at a moving object, and there is nothing that will develop their skill in this direction so much as practice in trapshooting.
It is quite probable that trapshooting facilities will be provided for all the army camps and cantonments. Not only does it train the soldiers to shoot, but it also furnishes them with healthful, outdoor recreation.

Major Mitchel Falls from Plane

It was officially announced on Saturday, July 6, by Major Kirby, in command of Gerstner Field, near Lake Charles, La., that Major John Purroy Mitchel, former Mayor of New York City, an officer in the Aviation Section of the Army Signal Corps, was killed by a fall from a single-seater scout plane at 7.30 A. M. It was reported officially that investigation had revealed that Major Mitchel's safety belt was unfastened at the time of the accident.

Because of the political prominence of the aviator prior to the entering of the service the accident attracted much attention and the press throughout the country was filled with accounts of the accident, and letters of condolence were sent to Mrs. Mitchel from many of the most prominent personages in the United States.

Major Mitchel went into the army service with previous military training, having taken the course at Plattsburg while he was Mayor. Upon joining the aviation service he was transferred to San Diego, Cal., where, after successfully covering the cadet training, he became a full-fledged flyer. He was frequently mentioned as having shown unusual daring.

With Mrs. Mitchel he arrived on June 19 at Gerstner Field from San Diego. Shortly afterward he began training for the pursuit of enemy machines, using a scout plane. He was reaching the finishing stages of training necessary for service at the war front.

The aviation branch of the United States army took charge of the body and escorted it to the City Hall. There it was received by the Mayor.

After lying in state it was escorted by the military authorities to St. Patrick's Cathedral, where requiem high mass was celebrated by the Rev. Terrence J. Shealy, S.J., assisted by Canon Cabanel, chaplin to the Chasseurs d'Alpines, and the Rev. G. Septier, rector of the Church of Notre Dame, of this city. Interment was at Woodlawn Cemetery.

A list of the honorary pallbearers included Theodore Roosevelt, Cleveland H. Dodge, Nicholas Murray Butler, George W. Wickersham, Jacob H. Schiff and Frank L. Polk.

Bluethenthal Is Cited After Death

Paris.—A posthumous citation of Arthur Bluethenthal, a member of the Lafayette Escadrille, who was killed on June 7, appeared in the official journal on July 7th. It read:

"Arthur Bluethenthal, an American pilot of first rank, volunteered for the Foreign Legion in order to serve in the aviation service of France. He made himself remarked from the beginning by his spirit, discipline and judicious courage. He continued by his own wish to serve with the French Escadrille during the present battle before passing into the American aviation service. He was killed in an aerial combat while directing distant artillery fire."

Pilot Baylies Dead

Word has been received touching on the fate of Frank L. Baylies of New Bedford, Mass. On June 17th, he was brought down inside the German lines while on a flight with his squadron. His comrades and the observation balloon observers all agreed that he had appeared to land his plane safely. One morning shortly after the occurrance a German aeroplane appeared over his late aerodrome and dropped a message saying "Baylies killed. Buried with military honors." Sergt. Baylies was a member of the famous Stork Escadrille, of which Guynemer was a member. He had won at the time of his death eight citations under French Army orders, and was recommended for the Legion of Honor.

The Liberty motored Curtiss biplane used for mail carrying. The mechanics are shown in the act of swinging the propeller

Aviator Gino Gianfelice Killed

On Sunday, July 7, Flight Sergeant Gino Gianfelice, one of the best pilots in the Italian aviation service and instructor of Captain Resnati, d'Annunzio, Testoni, and other famous Italian aviators, was killed in an exhibition flight at the army aviation field at Mineola, L. I., before a party of visitors, including Giuseppe Bevione, chief of the Italian War Mission; Howard E. Coffin, Major Gen. William L. Kenly, member of the Aircraft Board and Director of Military Aeronautics; Brig. Gen. Cormark of the British Mission, and many other high officers of the allied armies.

An official report of the accident was given out by Giuseppe Bevione, the head of the Italian Air Mission. The report said:

"Pilot Gianfelice left the ground for the third trial flight of the first American-built Caproni, fitted with three Liberty engines. He carried as passengers General Kenly, Captain Hugo d'Annunzio and Lieutenant Testoni of the Royal Italian Flying Corps. All the witnesses were thrilled with enthusiasm for the easiness, the surety and the agility of the flight, and for the speed of the machine and its ability in climbing, that makes this type an extraordinary successful type, famous the world around.

Went Up in Scouting Plane

"After Pilot Gianfelice had been warmly congratulated by General Kenly and all the other officials who had witnessed the wonderful exhibition, which lasted nearly an hour, he decided to show the virtues of an Italian scouting plane, the S. V. A. single seater fitted with the Spa engine, 205 horsepower. Such a machine is deservedly known all over Europe for its tremendous speed, its manoeuveability, its long raids at the front, among which was the raid to Friedrichshafen from the Italian front and the bombardment of Innsbruck in the daytime.

"Pilot Gianfelice for half an hour amazed the witnesses with the daring exploits he was performing in the air, such as numberless loops, exhibitions of high and exceptionally low speed, demonstrated all a few yards from the ground. Unluckily, after that he started in a nose dive from less than 300 feet from the ground, probably through a mistake in the judgment of the height from the ground. Pilot Gianfelice was driven to about twenty yards from the ground before he was aware of the danger and tried to assume the normal flying position, but it was too late. The machine came crashing to the earth, killing instantly the marvelous and unlucky pilot, who served his country up to his last breath, up to his last sacrifice, lavishly giving his wonderful talents and his own life."

Capt. David McK. Peterson

Capt. David Peterson, of Honesdale, Pa., went to France in 1916 after having received his aviator's license at the Curtiss aeroplane plant. He joined the Foreign Legion and soon was a Chassé pilot. He became a corporal in short order and a sergeant pilot soon after. Then he was elected to the honor society of aviation in France. When the famous Lafayette Escadrille was formed Capt. Peterson joined that, and continued to bring down Boche aeroplanes. He was made a Captain shortly after. He had received the Croix de Guerre with a palm, the highest citation of that medal. One day he brought down three German machines and a few days after he was to be decorated for it. While he was waiting for the French general, he went up in his machine. He saw two Boche machines to which he gave chase and brought them both down. When the Escadrille passed out of existence, he joined the American flying forces in France. He really is the premier American *"Ace"* for he was the first man to bring down five German planes under the American flag. Lieut. Douglas Campbell was reported to be the first Ace, but that was the first American trained Ace. Peterson was the first American to bring down five German machines while flying under the American flag in the Lafayette Escadrille.

Capt Peterson, it is expected, will complete the life story of the late Major Raoul Lufbery, which he had not completed at the time of his death.

General Pershing's aviation report of June 29th, says: "Lieut. Raymond shot down a German aeroplane on the morning of June 24th. Two other hostile planes were shot down on the 25th, by Major Hartney and Lieut. McArthur."

Lieut. Putnam, of Brookline, Mass., brought down his ninth hostile aeroplane north of Toul, on the night of June 30th.

Since the middle of April the American fliers on the French front have brought down twenty-seven German planes. In that time they have lost less than half that number.

A dispatch from Gen. Pershing dater July 3rd, says: "American aviation squadrons co-operated with our troops in the action north of Chateau Thierry. Three of our aviators did not return."

In the course of the day there has been much aerial activity and the encounters reveal the fact that there are now gathering in the Marne region a really formidable number of American flying men. Two German machines were destroyed.

A dispatch from Gen. Pershing dated July 3rd, says: "In the aerial fighting today four more enemy machines were brought down. Victories are claimed for Lieutenants J. H. Stephens of New York, K. L. Porter of Dowagiac, Mich.; Ralph O'Neill of Denver, and Maxwell Perry of Indianapolis.

Defending Paris

Tommy Lennon, formerly the fastest quarter-miler on Lawson Robertson's University of Pennsylvania team, is one of fifteen American aviators who are aiding the French fliers in the defense of Paris against air raids.

Two American Fliers Awarded War Medals

Paris—Sergeant Frank L. Baylies, of New Bedford, Mass., and First Lieutenant David E. Putnam, of Brookline, Mass., American aviators have been awarded a war medal by the Foreign Service Committee of the Aero Club of America, "for valor and distinguished service."

Edwin Parsons, of Springfield, Mass., a member of the Lafayette Escadrille, is mentioned in official citations as "an excellent pilot who has downed three enemy aeroplanes.

Investigators Go to Dayton

Dayton, Ohio, July 9.—Attorney General Thomas W. Gregory arrived here today to lend legal aid in the conduct of an investigation of matters pertaining to the aircraft program. His arrival was within twenty-four hours of that of Charles E. Hughes, who is investigating aircraft production by direction of the President.

Both men refused to say what the nature of the investigation is to be. Mr. Gregory said men from other cities might be summoned. The investigation continued today at the Federal Building behind closed doors.

Plan Air Mail for Spain

Madrid, July 9.—Establishment of an aeroplane service between Madrid, Barcelona, and the Balearic Islands is proposed by a newly formed company which has made application for official authorization to the Ministry of Public Works. The company would first start a mail service and eventually would carry passengers. One trip from Madrid to the islands would consume four hours.

The company, according to an announcement by the Ministry of Public Works, proposes also to establish other aeroplane routes between Madrid and points in the north of Spain. It asks no subsidy, but merely wants landing places and the right to put stamps on the mail carried.

Main building of the Red Cross Convalescent Hospital at Cuttyhunk, Mass., looking over Vineyard Haven toward Martha's Vineyard Island. The nurse shown in the foreground is the Head Nurse, Miss M. Churchill. The dog is Cleopatra, a Red Cross or Police Dog.

The Red Cross Convalescent Hospital at Cuttyhunk, Mass. A beautiful, comfortable convalescent home for aviators

The accompanying photograph shows the new Red Cross Convalescent Hospital situated at Cuttyhunk, Mass., which has just been recently established for the use of injured aviators. While it is well equipped as a hospital, its real mission is to assist the aviators back to health and strength. Dr. Norman E. Ditman, the medical director, and his staff are anxious to help the aviators. The Home is equipped with billard rooms, tennis court, and other conveniences.

How to Get to Cuttyhunk

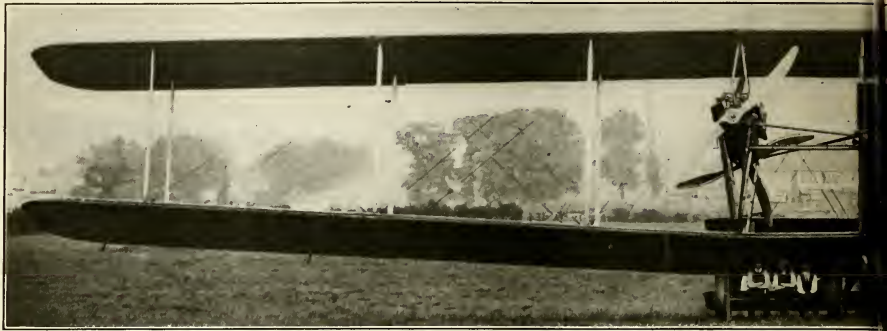
Cuttyhunk is reached by boat sailing 9:30 A.M. daily from Merrill's wharf (foot of Walnut St.), New Bedford, Mass.

Connecting train leaves Boston 6:40 A.M., arriving at New Bedford 8:35 A.M.

From New York, Fall River boat leaves Pier 14, North River (foot of Fulton St.), daily at 5 P.M., arriving in Fall River 5:30 A.M. Trolley from Fall River to New Bedford—one hour run—leaving Fall River at frequent intervals.

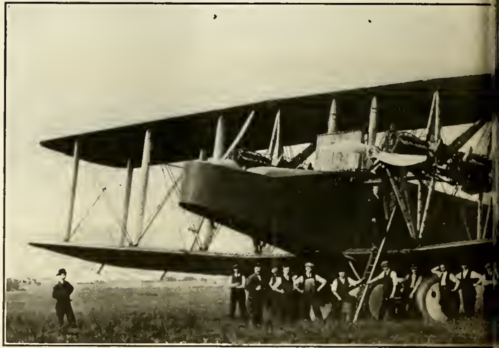
From New Bedford—*after June 21st*—New Bedford line steamers leave Pier 40, North River, foot of Houston St., daily at 6 P.M., arriving at New Bedford 6:30 A.M., at wharf foot of Union St.—two blocks from Cuttyhunk boat wharf.

Train connections from New York to New Bedford via Providence and Taunton or Fall River.



Photographs of the latest type of Handley-Page Air Cruiser equipped with four motors. This machine, the photographs of which are reproduced herewith, by courtesy of the New York Herald and the New York Times and Mr. W. H. Workman, representative of Handley-Page, can carry more fuel and useful load than is needed to fly across the Atlantic by way of the Azores

Major-General William L. Kenly, Director of Military Aeronautics, who made the first flight in the first Handley-Page Air Cruiser built in the United States. General Kenly has probably flown more miles than any other officer of his rank, having always used the aeroplane to go from place to place when he was in France and upon his return to the United States

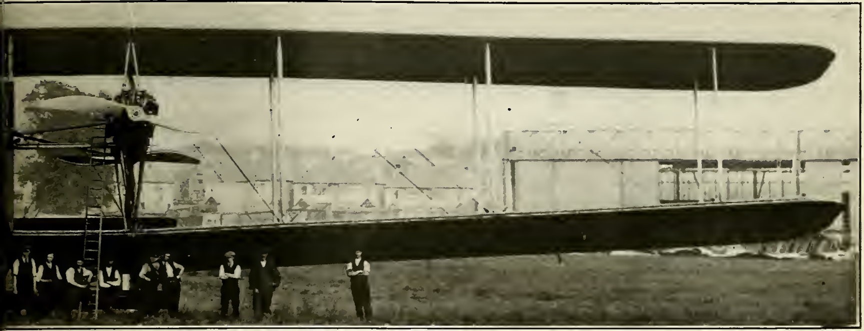


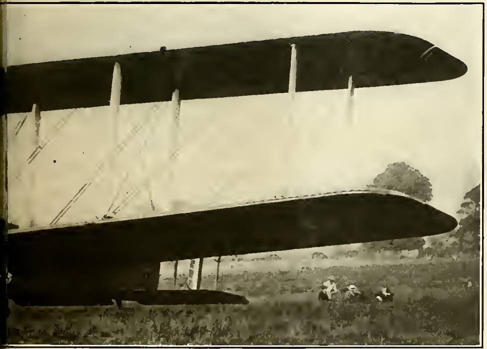
Three-quarter view of the latest Handley-Page Air Cruiser. The immensity of this mac
almost as tall as

CHARLES HEALEY DAY,
CHIEF ENGINEER AND DESIGNER.

HARRY BO
PRES

Officers of the Standard Aero Corporation, which has built





e noted in many ways. It will be noticed that the wheels are about five feet high, tanding by it

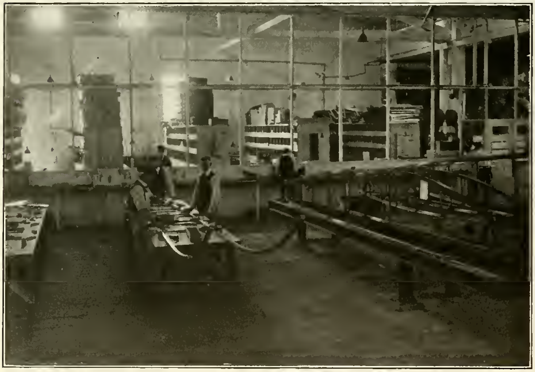
NGLE,

DANIEL L. MEENAN, JR.
TREASURER.

Caproni and Handley-Page air cruisers built in America

In an article describing Joseph Handley-Page, inventor of the aerial dreadnought which bears his name, W. H. Workman, one of Mr. Handley-Page's associates, said that to those who have heard of his firm as producing war machines only it might appear that Mr. Handley-Page's name has become known through the war alone. As a matter of fact, said Mr. Workman, Mr. Handley-Page's career in aeronautics extends over ten years. Mr. Handley-Page is 33 years old

Two views of the Springfield Aircraft Factory—one of the latest acquisitions to the American aeronautic industry, who are beginning to contribute substantially to the aeronautical equipment of the American Air Forces



Aviator Finishes 2,500-Mile Flight

Kelly Field, San Antonio, Tex.—Lieut. Frank M. Bartlett arrived here on July 3rd, completing a 2,500 mile flight from Scott Field, Belleville, Ill. He made the 341 miles between Scott Field and Park Field at Memphis, Tenn., in the record time of three hours and five minutes. He said his most thrilling experience was in a violent storm.

Italian Envoy Sees Victory Won in Air in Eight Months

Captain Giuseppe Bevione, Italian Commissioner of Aviation in the United States, has arrived in New York. His purpose is to obtain help from the United States for the development of Italian military aeronautics.

Captain Bevione is in the Alpini Corps. He is one of the youngest members of the Italian Parliament, representing a district in Turin.

Captain Bevione made the following statement as to his mission here:

"Through its raw materials, its industrial organization and its skilled men, the Entente can build and arm an aerial fleet at least ten times larger than that which the Central Powers can bring into being. If this result can be effectively achieved in 1919, if in eight months from now the allied nations have an aerial fleet in Europe with many thousand more machines than that of the enemy, and if this fleet will be used with intelligence and inexorable energy, then the war will be won, because the resistance of the enemy will be conquered and stricken at its very roots in their vital centres.

"To increase courageously our production for the time being to the extreme limits of our power means to ask America for an ever-growing quantity of raw material—metals, wood, chemicals, gasoline, textile fibre.

Movies of Air Mail Route

Moving pictures were made from the air on July 3rd, of the route of the aerial mail men between New York and Philadelphia. Similar pictures will be made of the line from Philadelphia to Washington. The camera man was Lieut. T. H. Webh, who also flew over the line of the parade in Manhattan and trained a moving picture camera on the scene below.

Lieut. Miller took the regular mail to Philadelphia and Lieut. Webh piloted the mail machine back, reaching Belmont at 3:15 o'clock in the afternoon.

American Flier Wounded

Brooklyn.—Word has been received that Oscar Lange, of the 104th Aero Squadron, has been wounded in France. No details were given.

Lieut. Schuyler Lee Dead

Flight Lieut. Schuyler Lee of the French aviation service, formerly in the Lafayette Escadrille, who was reported missing after an air encounter over the western front on April 12, was shot down and found dead east of Montdidier. Notification was received on July 6th by the officer's father.

Earl Hall, the Y. M. C. A. of Columhia University. The men seen here are being trained for war photography or for having charge of wireless used in aviation

AIR PROPULSION

By MORGAN BROOKS, Urbana, Ill.

THE term airscrew, considered by many writers on aeronautics as descriptive of propeller action, is a misnomer. The theory of the marine propeller, which seems to be adequately presented by the screw principle, has been transferred to air propulsion without sufficient regard for the extreme difference in the two fluids as to elasticity. Imagine automobile tires filled with water. In view of the current theory that air is driven by a propeller with a velocity never exceeding the product of the propeller's pitch and its revolutions, it was a surprise to find that air may be driven backward at a velocity nearly twice as great as this product indicates. The fact was so revolutionary as to cause the greatest care in measurement before its acceptance. Recognition of this superspeed action of propellers explains many anomalies of air propulsion and will undoubtedly lead to more exact formulæ for thrust and power calculations.

2. The purpose of this paper is to give proofs of the facts stated, and to point out some of the applications of the superspeed theory as it relates to propellers and blowers.

3. Superspeed is not observed readily in connection with the standard type of two-bladed propeller, owing to the masking of the effect by the mingling of high-speed air with a much larger quantity of inert air lying between the propeller blades. The measurements were made upon a special type of propeller having extremely short blades of great width, sweeping the entire 360 degrees of the disk area, in fact. It should perhaps be stated that with the acceptance of superspeed the definition of slip as "the backward velocity of the current from a propeller" must be abandoned; but another definition of slip, "the shortage of velocity translation as percentage of propeller screw advance," may survive owing to its convenience.

4. A propeller of the wide-blade type described having an experimental mean pitch of 2.53 ft., gives a wind on static test that flows 3.33 ft. per revolution, regardless of the rotation speed of the propeller. These values were determined for the writer by Prof. E. P. Lesley at the Leland Stanford Junior University wind tunnel, confirming his own measurements. The superspeed ratio, 3.33/2.53, is 1.32, and these figures bear so direct a trigonometrical relation to the blade angle as to suggest that air instead of being swept backward by screw pressure is driven back by precise reflection or batting action.

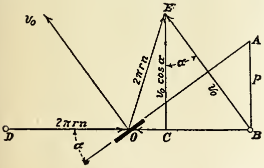
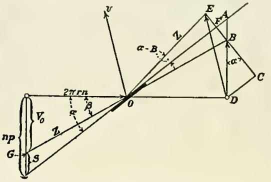


Fig. 1. Diagram Illustrating Test Conditions for a Wide-Blade Propeller Having a Blade Angle (a) of 36 Degrees

5. The diagram, Fig. 1, illustrates nearly to scale the test conditions for the propeller mentioned above having a blade angle, α, of 36 deg. The blade element indicated at O is moving toward the left at the velocity indicated by the line $BO = 2\pi rn$, around an axis parallel to CE far below the plane of the paper, and strikes an air particle at point D. The relation of particle to blade is unchanged by assuming that the particle D moves to the right at same speed against a stationary blade, and is reflected to point E in unit time. Had the blade not been in the way the particle would have reached B, hence the blade has deflected the particle in the direction BE, represented also by the vector Ov_0 with respect to the plane. Ov_0 is perpendicular to the instantaneous position of the blade when striking the particle. Under the reflection theory assumed, the axial velocity of the air particle is the projection of this vector, that is, $CE = v_0 \cos \alpha = 2\pi rn \sin 2\alpha$. To the same scale BA represents pitch multiplied by revolutions, the accepted air velocity by the screw theory. Since $BA = 2\pi rn \tan \alpha$, the ratio of superspeed velocity to screw-pitch velocity is $CE/BA = 2 \sin a \cos a/\tan a = 2 \cos^2 a$. For the 36-deg. angle of the special test propeller this ratio, since cos 36° = 0.81, is 1.31, which agrees with the value 1.32 experimentally determined by pilot-tube measurement with sufficient precision to warrant acceptance of the reflection theory, especially when similar close agreement was found with a blade of 28 deg. angle and by other confirmatory tests.



.Fig. 2. Diagram Illustrating Test Conditions for a Propeller Operating on a Flying Plane or in a Wind Tunnel

6. To illustrate the more complex condition of a propeller operating on a flying plane or in a wind tunnel with corresponding wind conditions, Fig. 2 is offered. Here, as before, the blade, instead of rotating to the left at the velocity $2\pi rn$, is assumed stationary, and the air particle at G is assumed to move to the right at the velocity $2\pi rn$, combined with the velocity V_0, also reversed, representing the plane's translational velocity, or, in the case of a wind tunnel, that of the impressed wind. In unit time the particle moves along the diagonal path Z, strikes the blade at O, and is reflected to E. The angle of incidence and of reflection is $a - \beta$. But for the blade the particle would have reached B in the same time, so that the blade action is represented by BE, while under the screw theory the motion would be BA, the slip, which is more clearly indicated as S at the left of the diagram. The axial projection of BE is $BE \cos a$, not represented in the diagram, and the ratio $BE \cos a/BA = 2 \cos^2 a$, the same ratio as found for static test conditions. This relation is derived as follows:

$$BE = 2\,FE = 2\,Z \sin (a - \beta) = 2\,Z\,(\sin a \cos \beta - \cos a \sin \beta)$$

but

$$Z \cos \beta = 2\pi rn = np \cos a/\sin a$$

and

$$Z \sin a = V_0$$

hence

$$BE = 2 \cos a\,(np - V_0)$$

and

$$BE \cos a = 2 \cos^2 a\,(np - V_0)$$

7. Thus either for static or flying tests an air propeller produces a velocity or a change in velocity which has a superspeed ratio of $2 \cos^2 a$ as compared with the screw-advance theory. This factor varies from nearly 2 for low pitch angles found near the blade tip to 1 for a 45-deg. angle, the steepest blade angle for effective work in propellers. For a propeller of constant pitch equal to diameter, a normal design, the superspeed ratio is 1.8 for the blade tip and 1.4 at half radius. Since the activity of propellers is confined mostly to the outer half of the blades, normal values for superspeed would lie usually between 1.5 and 1.6.

8. In wind-tunnel tests, where alone velocities of the air can be measured satisfactorily, the propeller activity BE is combined vectorially with the wind velocity V_0, making the vector DE, represented also by O^v, the velocity to be measured. The difference between this and $DA = np$ is not very marked except at rather heavy slip conditions. For low blade angles, however, where the superspeed ratio is more pronounced, careful speed measurements show that the air leaves the propeller at higher velocities near the blade tips than part way in, a condition inconsistent with the screw theory for standard-type constant-pitch propellers. Eiffel's "Recherches" presents an elaborate collection of data showing this condition to exist, for which no explanation is offered, but the reflection theory explains it.

9. When the direction of the air flow from a static propeller is investigated by means of light ribbons, they show that the air moves in a direction strictly perpendicular to the blade angle, the condition demanded by the reflection theory but not by screw action. More over these ribbons indicate that the stream contracts in diameter slightly as it leaves the propeller with its rotating whirl, whereas with the squeezing action of a screw it would be expected that the air would be expanding rather than contracting. Fig. 3 is an isometric drawing to show this rotating, contracting whirl.

10. The most convincing demonstration of the velocity of air leaving a propeller faster than the propeller screw advances is found in a test made with two propellers connected in tandem, illustrating a wind-tunnel test. Calling the forward propeller a blower, for distinction, assume that it provides a wind at 30 miles per hour, or 44 ft. per sec., and that the propeller is driven in this wind at a speed just above idling speed, such that its revolutions times pitch is, say, 48 ft. per sec. An aneompmeter shows a velocity of about 50 ft. per sec. If now the blower be shut down, while the speed of the propeller is maintained constant, the wind velocity rises to 75 ft. per sec. instead of remaining constant as demanded by the screw theory.

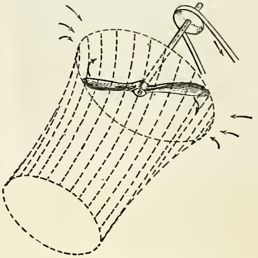


Fig. 3. Sketch Showing Direction of Air Flow from a Static Propeller

11. Accepting superspeed, then, it is seen that since the air is driven backward at an excess rate, the thrust due to this unexpected acceleration is, by the Newtonian laws of dynamics, due in greater degree to speed and less to the quantity of air handled than is commonly supposed. It has long been recognized that the evaluation of dynamic thrust equations requires the questionable assumption of blade activity over a larger portion of the propeller disk than that covered by the blades alone. Indeed, some authorities, such as Riach, use the entire disk area as that actuated by the propeller. Seventy-mile flight at 30 per cent slip is commonly supposed to mean that the air is driven backward at 30 miles per hour, while its actual speed is nearer 50 miles per hour. This means that the column of air with respect to the plane is not 100 miles but about 120 miles per hour in length. No wonder it is difficult to get satisfactory results from air-dynamics formulæ now in use, except from well-developed empirical formulæ.

12. The proper interpretation of superspeed bids fair to reconcile the thrust and power values as derived from the static tests with those of wind tunnels or of flight, whereas it seems to be the common opinion today that flying performance cannot be predicted from static tests. With the precise air-dynamics formulæ sure to come, a single static test of a propeller should furnish all necessary data for the production of complete flying-performance curves.

13. As a preliminary empirical approximation, the following formula may prove useful: $T = T_0 - T_0'$, where T is flying thrust, T_0 the static thrust at propeller speed n, and T_0' the static thrust at propeller speed V/p, where V is plane velocity and p propeller pitch. That is, T_0' is taken statistically at what is idling speed in the wind. Since all static-thrust values are proportional to the square of the rotations, a single static thrust at any speed enables both T_0 and T_0' to be derived. The physical meaning of this seems to be that the wind-tunnel blower relieves the propeller of that portion of T_0 represented by idling speed, even though the propeller, giving super-speed, sends air backward when tested statistically at speed V/p, faster than the velocity V. Under this formula the flying thrust at 30 per cent slip is found to be 51 per cent of the static thrust at speed n.

14. Correct air-dynamics formulæ will not produce the changes in propeller design that might be anticipated, since propeller engineering is nearly always based on experience. The propeller, or air bat, is extraordinarily efficient today. However, it is hoped that this paper may lead to a clearer conception of the underlying physical principles of air propulsion.

Presented at the Spring Meeting, Worcester, Mass., June, 1918, of The American Society of Mechanical Engineers.

FOREIGN NEWS

FRANCE

Paris, June 28th.—A report on the operations of French aviators, issued June 28th says:

"On June 26th-27th twenty German machines were brought down or put out of action, and four captive balloons were burned. Our bombarding squadrons in the same period during the day and night dropped fifty-eight tons of projectiles on aviation grounds along the Somme and Aisne and on cantonments and bivouacs at Rozieres-en-Santerre, Fismes, and Guignicourt, and the stations of Soissons, Fère-en-Tardenois, and other places. Two munition depots were exploded and several fires were observed."

On June 29th, our chasing planes brought down fifteen German machines and destroyed two captive balloons. Nineteen other enemy aeroplanes were damaged.

Our bombing planes in the course of the same period carried out day and night expeditions in which forty-seven tons of projectiles were dropped with success upon aviation grounds in the Somme sector, on bivouacs in the region of Rozieres and Braye, in the valley of the Avre and on the railroad stations of Soissons, Fere and Tardenois.

In addition five tons of explosives were dropped June 28 on German troops which were preparing a counter attack in the region of Cutry.

Lieut. Fonch brought down three German aeroplanes on June 25th and two others on June 27th, bringing the number of machines destroyed by this pilot up to forty-nine.

On June 30th, twenty-one German aeroplanes were brought down or put out of action, and six captive balloons were set on fire. The following night our bombing machines dropped twenty-two tons of projectiles on aviation grounds in Picardy, the Roye railway station and munitions depots at Villers-Carbonnel, where a violent explosion occurred.

The French War Office statement for June 7th contains the following:

From July 1st to 6th our aviators brought down or put out of action eighteen enemy planes and set on fire seven captive balloons. In the same period our bombing machines dropped fifty-six tons of projectiles on stations, cantonments, establishments and aviation grounds in the enemy zone. A fire was started in the aviation post at Chaulnes and at Amagne-Lucquy, and violent explosions followed by fires occurred in munitions depots at Ncuville and Roye.

GREAT BRITAIN

The British report of June 27th, says:

"On the night of June 26-27, sixteen tons of bombs were dropped on various targets. Our aeroplanes attacked the chemical works at Ludweighshafen, the factories and railway sidings at Saarbrucken and the airdrome at Bolchen. Several bombs fell on an active furnace at Saarbrucken. At Bolchen two hangars were set on fire. All our machines returned safely."

A full day's work was done on June 27th by our reconnaissance, photographic, and artillery machines. There was some increase in hostile activity in the air, and more fighting occurred.

Twenty German aeroplanes were destroyed and nine driven down out of control. Fourteen of ours are missing..

There was much fighting in the air on the British front on the 28th inst., and enemy machines showed considerable activity. During the day we shot down seventeen German aeroplanes and drove down six others out of control. Three of our machines are missing.

Our airmen and balloon crews, employed in observation work, took advantage of the fine weather to co-operate with the artillery in engaging hostile batteries and ammunition dumps with good destructive effect. A great number of explosions and fires were caused by this work. Our photographic machines also were active, and many reconnaissances were carried out both by day and night.

Twenty-two tons of bombs were dropped by us during the day on various targets and fourteen and a half tons in the course of the following night.

Hostile activity was not great on June 29th, but our fighting machines succeeded in destroying nine German aeroplanes and disabling eight others. Five of ours are missing.

Fifteen tons of bombs were dropped, the most important targets being the railway stations at Lille, Courtrai, Comines and Estairs.

At night there was bombing activity on both sides. The enemy did virtually no damage, but lost one machine. We dropped eighteen tons of projectiles, of which eight tons were launched upon railways.

On Saturday night bombing squadrons attacked the railroad works at Thionville, the sidings at Metz, Sablons and enemy aerodromes at Frescati and Boulay, as well as other military objectives. The presence of a mist prevented observations of the results.

On Sunday our aeroplanes dropped many bombs on the Hagenau aerodrome with good results. The barracks and station at Landau were also bombed. An enemy aerial formation over Landau heavily attacked our machines. Three of the enemy's aeroplanes were destroyed and two of ours are missing.

"On June 30th we had a most successful day in the air.

"In fighting, twenty-five enemy machines were shot down and ten others were driven out of control.

"Two German balloons were destroyed.

"Our airmen carried out a number of reconnaissances over the lines on June 30th, both by day and by night and many aerial photographs were taken.

"The number of hostile batteries destructively engaged by our artillery with aeroplane and balloon observations was greater than on any day during the past fortnight.

"Twenty-nine and a half tons of bombs were dropped by us by day and seventeen tons on the following night. Of the latter more than seven tons fell with good effect on the railway connections at Tournai. From the whole of these operations all our aeroplanes returned safely with the exception of one scout and one night bombing machine."

An official statement issued by the Air Ministry, July 1st, reads:

"On the night of June 30th-July 1st, attacks were made on the enemy aerodrome at Boulay and on railway works and stations at Thionville, Remilly, Landau, Zweibrucken and Saarbrucken. The chemical works at Mannheim were again attacked.

"On July 1st the railway and workshops at Karthaus, the station at Treves and the railway triangle of Metz Sablons were bombed with good effect. One hostile machine was shot down and two of ours are missing. One of the machines reported as missing on June 30th has returned."

On July 1st our aeroplanes were very active, the fine weather enabling much work to be done in co-operation with the artillery, as well as reconnaissance and photography.

Twenty-five German machines and three German balloons were destroyed during the day, and fifteen other hostile aeroplanes were driven down out of control. In addition, two large hostile night-flying machines landed behind our lines, the occupants being taken prisoners. Eight of our machines are missing.

Twenty-two tons of bombs were dropped during the day and thirteen tons during the night. All our night-flying machines returned safely.

The independent air force communication on aerial operations says:

During the night of July 1st-2nd, the enemy's aerodrome at Boulay was successfully attacked, bursts being observed on the aerodrome and hutments. The Oppau works, soda factory and railway line at Mannheim were bombed with good effect, as were also the railway works at Thionville.

On July 2nd bombs were dropped on the railway station at Treves. Our formation was attacked over its objective by twelve enemy machines, one of which was shot down.

The railway sidings and sheds at Cohlenz were bombed with good results. All our machines returned safely.

The official communication of July 3rd, dealing with aerial operations reads:

"The weather on July 2nd was fine but hazy. Our machines carried out reconnaissance, artillery and photographic work as usual, but there was less enemy activity.

"Thirteen German aeroplanes were destroyed and nine others were driven down out of control. One German balloon was shot down. Four of our machines are missing.

"Nineteen tons of bombs were dropped in the course of the day and night on enemy railways, dumps and billets."

For July 3rd the weather was cloudy and enemy activity was slight. Our machines carried out a number of reconnaissances and co-operated with the artillery as usual. Six enemy machines were destroyed and four were driven down out of control.

During yesterday and last night the British machines dropped sixteen tons of bombs, the railway junctions at Lille and Courtrai being the principal targets. All our machines returned safely.

The British aerial statement on July 5th said:

"On July 3rd the weather was cloudy and enemy activity was slight.

"Our machines carried out a number of reconnaissances and observed as usual for the artillery. Six hostile machines were destroyed and four others driven down out of control.

"During the day and the following night, we dropped sixteen tons of bombs on the railway junctions at Lille and Courtrai. Our machines returned safely."

The official report of July 6th on aerial operations says:

"There was little fighting in the air on July 5. Two German machines were destroyed and one was driven down out of control. One of our machines is missing.

"Our aeroplanes and balloons carried out a large amount of successful artillery work. Nineteen tons of bombs were dropped on selected targets during the day and the following night.

"Eleven German aeroplanes were destroyed and ten driven down out of control as a result of combats. One hostile balloon was shot down in flames. Four British machines are missing."

An official statement issued on July 6th by the British Admiralty says:

"During the period between July 1 and July 3 one enemy seaplane was destroyed and three indecisive combats took place.

"Fifteen and a half tons of bombs were dropped by our airmen. Fires were started at Bruges. At the Varssenaire aerodrome bursts were observed among the sheds, hangars and warehouses, while other bombs exploded on the Maria Aelter aerodrome and at Zeebrugge, near the lock gates and near two submarines. Four hits were registered on an enemy destroyer off the Bassin de Chouage and on sheds, warehouses and quays at Ostend."

The official communication dealing with aerial operations, issued on July 7th, says:

"Our balloons and observation machines carried out much valuable work on the 6th instant. There were few combats in the air. Three German aeroplanes were destroyed and one was driven down out of control. One of our machines is missing.

"Seventeen tons of bombs have been dropped on various targets during the past twenty-four hours."

The Air Ministry's report on aerial operations says:

"Our squadrons successfully attacked railways at Metz Sablonz Saturday afternoon. Two and a half tons of bombs were dropped on our objectives. Our formations were attacked over the objectives by enemy machines, one of which was driven down. All of ours returned.

"During the night our machines successfully attacked the railroad station and sidings at Saarbrucken and the railways at Metz Sablons."

ITALY

The Italian War Office reported on June 29th as follows:

"Railway centers and enemy troops in movement were bombarded by our allied airmen. Three enemy machines were brought down. In the course of the last two days our bombardment flights dropped about 18,000 kilograms of bombs on important centers and crossroads of the enemy.

"On the lower Piave troops and transprots were attacked with machine gun fire at a low altitude. One of our airships effectively bombarded a railway junction in the Sugana valley.

GERMANY

The German official of June 28th, says:

"Strong flying forces have been brought into action. They led to violent aerial combats. Yesterday our aviators shot down twenty-five aeroplanes and one captive balloon, and our anti-aircraft guns shot down five aeroplanes."

The German War Office in its official communication of June 30th says:

"In the air nineteen enemy aeroplanes were shot down."

The official communication from German headquarters on July 3rd says:

"Four aeroplanes were shot down from an American squadron of nine units."

MODEL NEWS

Edited by John F. McMahon

Junior Aeronautical Reserve Has New Member

Considerable interest is shown lately in the "Junior Aeronautical Reserve" more so I suppose on account of the good model weather we have had lately. Mr. Garber, President of the Capitol Model Aero Club sends me a very interesting outline of the work the club has been doing in preparation for their entry into the Model Aero Game as a step to the larger machines. His letter may be of interest to other model aero clubs who wish to get in line, and I reprint it here for your information.

"The Capitol Model Aeroplane Club," of Washington, D. C., has been in existence four months and a half. We realize the many benefits resultant from co-operating with the "Junior Aeronautical Reserve," and desire to list ourselves under its supervision.

We organized on February 5, 1918, and at the outset consisted of seven members. A constitution was drawn up, and the work of organization was assigned to various committees. Since then we have progressed steadily. We now number twenty-one active members and nine inactive members, which brings the club up to its full strength. We have limited the number of members, because we feel that some members are more active than others, and that by an elimination of the "dead wood," we can move much faster. This may seem a bit unfair to the slower members, but we know that when our club is fully organized, we can then take on many more, and will be strong enough to aid the weak, without danger of drowning ourselves.

The active members, are those who actively engage in the affairs of the club, attending meetings and fulfilling offices. The inactive members are those who by reason of a position or other obstruction, find themselves unable to attend the meetings, but who aid the club by various contributions of knowledge, experience, material, money, etc. We find this to be an excellent arrangement, as we have at hand a number of professional chemists, mechanics, etc., who give invaluable aid to us, although they cannot always be with us.

We have two classes of members: Junior members and senior members. The junior members are those who have not passed the qualifications as senior members, and who have no vote. The senior members become such after they have passed one or more of the tests as set forth in the Handbook of the club. These tests determine the knowledge of the members, and the competition developing from the divisions, spurs the members to learning.

Besides the features already mentioned, there are others which we use, most of which we have originated, which are as follows: The War Game, The Scrap Book, The Committees, The Correspondence Course, The Library, The Supply Division, The Workshop, The Bulletin, and The Lectures.

Briefly, they may be explained as follows: The War Game, is a method of spurring the members to effort, not only for themselves, but for the Club. It consists, essentially, of a board, marked off into two divisions, which are marked with rows of holes. Each member is given a row, and the advancement depends upon himself. You see, the board represents a battlefield, and each member is piloting an aeroplane over no man's land. We have a list of points which a member may gain, by working for the club, through its committees, and at each point, he moves up one hole. When he has advanced far enough to gain the top hole, he is given a spin at a wheel. The wheel revolves until it arrives at the number of one of the competitors on the opposite side, who is either captured or killed. If the "Enemy" is behind the lines, he is captured, but if he is within three points of "No Man's Land," he is killed. If he is killed he is out of the game, but if he is captured, he must gain three points to resume playing. There are many rules, and if any of the clubs desire a list of them, the secretary will gladly comply.

The Scrap Book, is a book, kept by the secretary, which is filled by the newspaper clippings, pictures, etc., collected by the fellows.

The Committees are as follows: The Photography, which is responsible for photographs of everything relating to aviation that goes on in the capitol; the Contest Committee, which arranges for all competitions; and the Patent which reserves to a member the exclusive use, for a limited period, of any feature of the member's own contrivance.

The Correspondence Course, is a method we have on instructing members. We start them on the principles, and continue until they have mastered model aviation as completely as we can fit them.

The Library is a collection of books, magazines, catalogues, etc., which the members collect for the enlightenment of members.

The Supply Division, is for the purpose of finding where materials can be bought cheapest and best, and advising the members accordingly. They are also enabled through this division to pool on an order and save money, postage, etc.

The Workshop, is one shop, toward which all of the members contribute in the manner of tools, materials, etc., to which all fellows, who have no shop of their own, can come and work.

The Bulletin is a paper, issued monthly, which advises members who are inactive, absent, or otherwise unable to attend the meetings, of the doings of the club. This is quite successful and helpful, as it keeps all of the fellows interested.

The officers of the club are as follows: President, Paul Edw. Garber, 1726 M St., N. W.; Vice-President, Geo. O. Riggs, 1824 Belmont, N. W.; Secretary, Charles Irelan, 2511 Cliffbourne; Treasurer, Thomas Smallwood, 908 14th, N. W.

The meetings are held every Tuesday evening at 7:30 at the home of the Secretary.

The club controls about thirty flying models, some of which are exhibited about the city, and gain much publicity and commendation for the club.

Lectures are given by interested patrons upon different subjects at various times. This makes the meetings attractive. Among the lectures I might mention the following as having been especially instructive:

"Bird Flight and Aviation," by Dr. Paul Bartschl, of the Smithsonian Institute.

"Technicalities and Mathematics of Wind Pressure and Air Resistance," by L. W. Heron, head machinist instructor, McKinley Technical School.

"Military Aerial Photography," by the President of the club.

Besides those mentioned, we might mention the following as patrons of the club:

Mr. Kaufman, owner of the *Evening Star*, Washington, D. C.

Mr. George Ireland, of the Patent Office.

Lt. Col. Geo. Riggs, Chief Intelligence Officer, U. S. Expeditionary Force, France.

Alexander Graham Bell, Inventor of the Telephone, etc., and many others.

The qualifications for admittance into the club are as follows:

No age restriction.

Deep interest in aeronautics.

Mechanical ability.

Permission of parents.

Entrance fee, $.25 semi-monthly dues, $.05.

We will be glad to give any further information concerning the club to any desiring same. Any resident of Washington or vicinity wishing to join the club, kindly communicate with the Secretary, and admittance will be considered.

Handley-Page Bombing Aeroplane Model

The model shown in the accompanying illustration is of the very highest model construction, not one thing on the big machine is missing on this model, the shock absorbers, Rolls-Royce Radiators which are characteristic of the Handley-Page machine. The radiators on the model were made of thin soft brass and shaped around a special former, to the proper size.

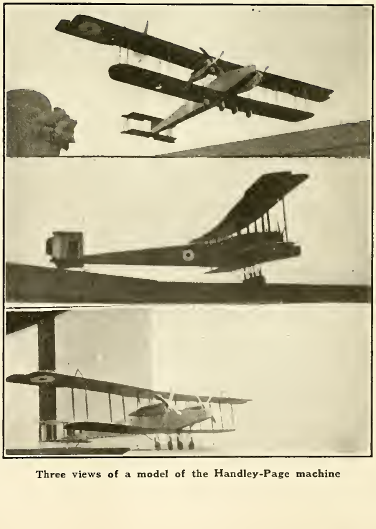
This model should be of unusual interest at the present time because of the talk going around in Aviation circles of the proposed crossing of the Atlantic Ocean, by large fleets of Bombing Machines built in this country, and then proceeding to the Western Battle Front to rain bombs on the Hun.

The Handley-Page is one of the machines that has been mentioned in connection with this flight and it may have the honor of being the first to cross.

The model is made of wood and the construction is much the same as the other models shown previously.

A model of this kind attracts considerable attention when placed on exhibition and the builder of a model of this type should get a good deal of pleasure out of the building of it as well as the profits from selling models of this kind as an advertising medium.

The model was constructed from data appearing in AERIAL AGE.



Three views of a model of the Handley-Page machine

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

A Tragedy in Two Acts

Place: Houston.

Time: Friday.

Characters: Inspector-General and Unknown Cadet.

Act One—Unknown Cadet meets Inspector-General on street and fails to salute.

Inspector-General: "What is your name?"

Unknown Cadet (thinking fast): "Johnson of the Fifth Cadets, sir."

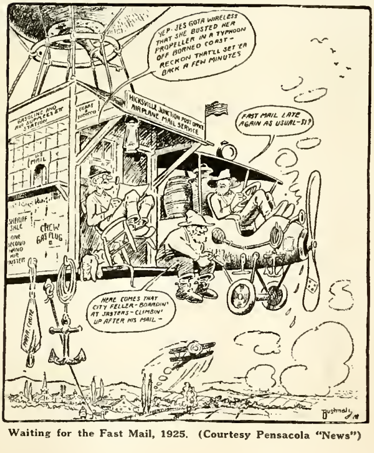
Act Two—Notice on squadron bulletin board: "Cadet Johnson confined to the Post for a period of one week for failing to salute an officer in Houston Friday."

Sequel: Cadet Johnson didn't even have a pass for Friday.

Greys Elegy (Royal Air Force Edition)

Reveille sounds the knell of opening day;
The Leyland lorries rumble o'er the lea;
The sergeant messwards plods his hungry way
And leaves the camp—ye gods—in charge of me.
And now the C. O. stalks upon the sight
And all the air a solemn stillness holds,
Save where the Sopwith wheels his droning flight
Or slackers tremble 'neath their blanket folds.
Beneath that canvas flap, that marquee's shade
Comes sounds of snoring, sonorous, loud and deep;
Each in his narrow bed till noontide laid
The sergeant-majors of the Squadron sleep.
The breezy call of incense breathing morn
The whirr of Monosoupes overhead
The comely W A A C's who glide among the corn
Can never rouse them from their snug soft bed.
Far from the madding crowd's inglorious game
Their sober wishes never learn to stray.
Be up and doing—nothing, they exclaim,
And earn an "even tenner" on their way.
And so the weary game meanders on
(I wonder if my bally breakfast 's laid)
Fried bacon will be good to gaze upon.
And then—Oh Help—I've missed the Staff parade.

—*Flying.*


YEP. JES GOTA WIRELESS THAT SHE BUSTED HER PROPELLER IN A TYPHOON OFF BORNEO COAST— RECKON THAT'LL SET 'ER BACK A FEW MINUTES
GASOLINE AND AIR SUPPLEES ETC STATION
CIGARS & TOBACCO
HICKSVILLE JUNCTION POST OFFICE AIRPLANE MAIL SERVICE
FAST MAIL LATE AGAIN AS USUAL—SI?
U.S. MAIL
SHERIFF SALE ONE SECOND HAND AIR DUSTER
CHEW GAS PLUG
HERE COMES THAT CITY FELLER—BOARDIN' AT JASTERS—CLIMBIN' UP AFTER HIS MAIL—
PARA. CHUTE
Bushnell 18

Waiting for the Fast Mail, 1925. (Courtesy Pensacola "News")

Learning to Fly

By "A Cadet"

One day I think all the instructors here are crazy, and the next day I get to wondering whether I am not the crazy one. You really can't blame them much for being nervous and high-strung. It is a ticklish job to have to ride in the same machine with these wild cadets.

Instructors are of two classes—cussers and non-cussers. They all are in the first class.

Instructors put cadets into two classes also—boobs and nuts. The boobs are nuts that have been coached.

When the instructor asks you "what in the name of h—— are you trying to do; wash your shirt?" he means, in gentle parlance, that your washboard tactics on the elevator control are not apropos.

My instructor hasn't told me yet to hitch my wagon to a star when the gasoline runs out, but this is the only thing he has omitted. He admires my gentle, caressing touch on the controls and tells me I drive like an old woman. He is sure I will make a good flier when they design planes that will fly and land alone.—*Rockwell Field Weekly Flight.*

"Allied Raid on Cologne Kills 146."—*News headline.*

Incidentally, the allied raid on Cologne shows that sauce for the gander is sauce for the goose.

U. S. will trust foe not to sink hospital vessel—will send the Comfort through the U-boat zone without armed convoy. —*Headline.*

Bombs kill nurses and men in German raid on hospitals—enemy fliers deliberately drop flares to identify Red Cross buildings before throwing down their missiles on wounded. —*Another headline on the same page of the same paper.*

Camouflage

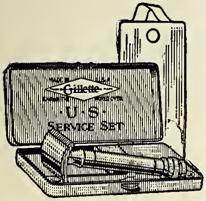
An aerodrome recipe for camouflaging a Caproni: "Paint it all over with Scotch jokes. The Germans could never see them.

N. B. Scottish readers are informed that it is entirely unnecessary to write the Editor a letter of protest. This has already been attended to.

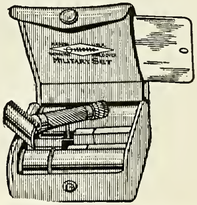
It's a Wise Bird that Steers Clear of American Aviators

When the American aviation camp was first opened, it was noticed that the birds were imitating the flight of the machines. A group of aviators were seated on the ground one day, when, to their surprise, they noticed a flock of about fifty larks flying near a machine. The machine did a bank to the right, and the birds followed. One to the left—the birds did likewise. A short nose dive—the birds all dived together. Then the plane mounted higher, followed by the birds. It went into a stall, then a "Vrille." The birds tried it and were dashed to the ground. They had never tried that before!—*From a letter from France.*

Gillette SAFETY RAZOR



The New U. S. Service Set—A solid metal case, heavy nickel-plated and embossed with the Insignia of the U. S. Army and Navy. Strong, thin, compact: 1⅞ inches wide, 4 inches long, ⅝ inch thick. 12 double-edged Gillette Blades (24 Shaving Edges). Contains a nickel-plated Gillette Safety Razor and Blade Box. Indestructible Trench Mirror inside the lid. $5



Military Set No. 18—For Uncle Sam's Officers, a Gillette Combination Set, in case of U. S. Regulation Khaki twill — nickel-plated "Bulldog" Razor; indestructible Trench Mirror fitted in pocket in lid; Shaving Brush and Stick Gillette Shaving Soap in nickel-plated Holders; two Blade Boxes; 12 double-edged Gillette Blades (24 Shaving Edges). $7

War service is throwing the spotlight on the Gillette

There are mighty few personal belongings a man in the Service can pack around—and the greatest of his comforts is his Gillette.

Wind-chap, sun-burn, cold water, cold weather only give the Gillette a bigger opportunity to show *service.*

There isn't a mile of the battle-fronts, nor a ship of the Allied Nations, but has its Gillette users by the tens and the hundreds. The compact, portable razor that can always be depended on for *service.*

Have you seen the new Gillette Sets specially made for the fighting man? Two of them are illustrated on this page. They were designed by members of the Gillette Organization in the Service — men who know what the fighting man is up against.

Simple and compact, fit the pack, the pocket or the ditty box. No strops or hones to clutter up the kit. Blades always sharp, always ready. No Stropping—No Honing. When a man wants new Blades he can get them in any Post Exchange, Ship's Canteen, or Y. M. C. A. Hut, here in America or overseas.

Our Paris Office carries stocks — is constantly supplying the American Expeditionary Forces. Gillette Safety Razors and Blades on sale everywhere in France, England, Italy, and the Eastern battle fronts.

Gillette Safety Razor Co.
of Canada, Ltd.
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Montreal

Gillette Safety Razor Societe
Anonyme
17 Bis, Rue La Boetie
Paris, France

Here's the Way to Get 100% Efficiency Out of Your Gillette

Try this when you shave tomorrow morning. Lather the beard thoroughly, and rub well in — that's essential with any shave.

Put in a new blade and screw the handle down tight. If you want a specially close shave, unscrew the handle a part turn.

Hold the razor naturally and easily, and tilt the handle so you can just feel the blade engage the beard.

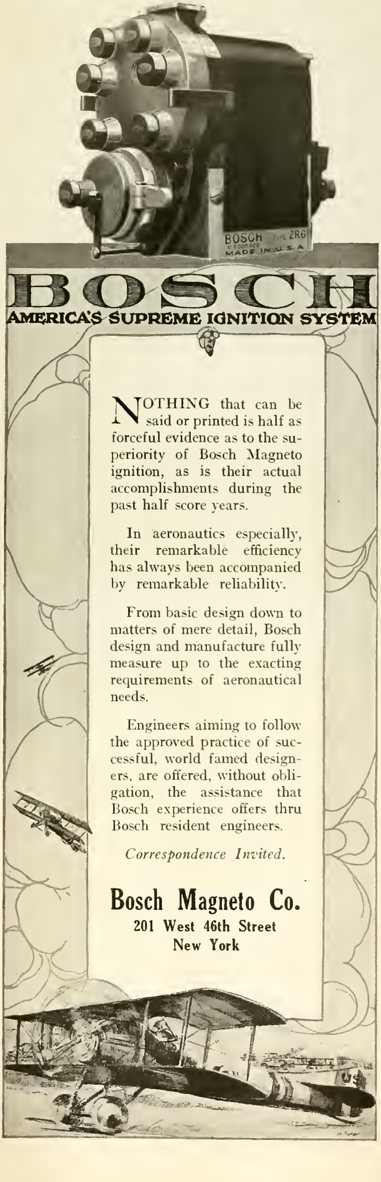
Then shave with short slanting strokes. It doesn't require any brute force to shave with a Gillette—the razor does the work.

Gillette Safety Razor, Ltd.
200 Great Portland St.
London, W., England

A. G. Micheles
53 Liteiny, Petrograd, Russia

Vedova Tosi Quirino & Figli
Via Senato, 18
Milan, Italy

Gillette Safety Razor Company
Boston Mass·U·S·A·



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In aeronautics especially, their remarkable efficiency has always been accompanied by remarkable reliability.

From basic design down to matters of mere detail, Bosch design and manufacture fully measure up to the exacting requirements of aeronautical needs.

Engineers aiming to follow the approved practice of successful, world famed designers, are offered, without obligation, the assistance that Bosch experience offers thru Bosch resident engineers.

Correspondence Invited.

Bosch Magneto Co.
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New York

General Pershing Protests Against Untried Aircraft

The New York *Herald* states that: "General Pershing has cabled the War Department protesting against the shipment to Europe of De Haviland 'Four' planes which have not been thoroughly tested in this country, according to information received by members of the Senate Military Affairs Sub-Committee engaged in investigating the aircraft situation.

"The report caused considerable anxiety among members of the committee, who interpreted it as an indication that serious difficulty had been encountered in the use of the machines being sent to France. The House Military Affairs Committee was told last week that 200 De Haviland aeroplanes had gone to France, and the information was given considerable currency about the capital as evidence of a better day in the aircraft programme.

"Members of the Aircraft Investigating Committee say they had learned that 478 De Haviland planes had been sent to France. The cause of General Pershing's complaint was not clear to members of the committee, and they were determined to continue their investigation to ascertain whether it was the result of faulty construction which might be remedied in future production.

"The De Haviland 'Four' is the type of plane upon which the United States was placing its chief reliance. Arrangements had been made for turning them out in large quantities for use as combat planes on the western front.

"The action of General Pershing added new impetus to the demand among members of the Aircraft Committee for the taking over of the three principal aircraft factories by the government. The committee has been considerably disturbed by the frequent reports of aircraft accidents in the American army and is now awaiting a detailed report from the War Department on the subject.

"It has also found undesirable conditions in several of the larger aircraft factories which it believes could be removed under federal control. Members of the Aircraft Committee expect to go to Langley Field, at Norfolk, within a day or two to inquire more thoroughly into the cause of the accidents. Several members blame the weight of the Liberty motor for many of the fatal accidents recently. They believe that the finding of the Senate Military Affairs Committee reported last winter to the effect that the Liberty motor is not suited to light combat planes still stands."

Caproni Ready for Trans-Atlantic Flight

Lieutenant Leopoldo Belloni, of the Royal Italian Flying Corps, has advised the Aero Club of America that Mr. Caproni, the famous Italian aeroplane constructor, is ready to undertake the trans-Atlantic flight and the plan was considered at a meeting of the Executive Committee of the Club.

Lieutenant Belloni advised Mr. Alan R. Hawley, the president of the Club that Caproni has the machines capable of making the flight and hundreds of aviators who are ready to undertake the flight. Mr. Caproni is ready to send to the United States a machine capable of making the trans-Atlantic flight, or build such a machine in the United States on Caproni's plans.

Lieutenant Belloni agreed with the Executive Board of the Aero Club that the value of the trans-Atlantic flight is in being able to do it again one thousand times in six months and ten thousand times in one year. This, he said, would be entirely possible.

Caproni can undertake to establish an American factory, or have the machines built at existing American factories by the thousand.

Lieutenant Belloni stated that, having the aeroplanes and the pilots, the rest was a matter of faith, skill and organization. They have the first two, and if the American Government or the Aero Club will supply the latter, the flight can be made this year.

The Executive Committee of the Club is transmitting the Caproni plan to the Washington authorities, urging that Caproni's offer to bring over a trans-Atlantic aeroplane be accepted and Mr. Caproni be officially invited to do so through the Italian Government.

The following telegram was received asking the Club whether it can undertake to deliver from three to four thousand pounds of saccharine to London by aeroplane:

"A very important London firm cabled request to obtain estimate cost of shipping three or four thousand pounds saccharine to London by aeroplane or seaplane. Willing to pay substantial amount as price for Red Cross Fund. In explanation, this cable inquiry, is fact that saccharine is very scarce and much wanted in London due to sugar shortage. We are unable to obtain ship space to England. Wire what is possible cost and any other particulars.

(Signed) MONSANTI CHEMICAL WORKS."

SPERRY

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MANUFACTURE
of
AERONAUTICAL INSTRUMENTS
OF ACCURACY
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MANHATTAN BRIDGE PLAZA
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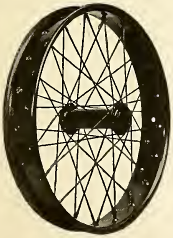
***of* Geneva, New York**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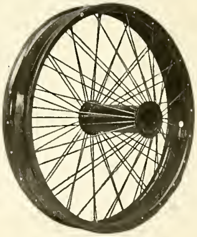
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DELIVERIES ARE PROMPT
WRITE FOR PRICES

THE AERONAUTIC TRADE DIRECTORY

Incorporated

THE first Directory of the aeronautic Industry is under preparation.

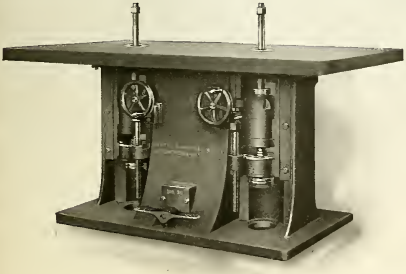
It is to appear quarterly, with monthly revision supplements, and will include the names, addresses, names of officers, executives, engineers and advertising managers, of manufacturers and dealers of aircraft, engines, accessories and different kinds of equipment used by aircraft manufacturers, and engineers, by aviators and at aerodromes, etc.

Manufacturers and dealers are invited to send information to be listed in the Directory to

THE AERONAUTIC TRADE DIRECTORY
Incorporated
280 Madison Avenue
New York City

Whitney Direct Motor Driven Double Spindle Shaper

The HIGH SPEED MOTORS are mounted directly on Spindles. (*No Gears.*)



No. 39. Direct Motor-driven Double Spindle Shaper.

No Countershaft required.
No belts to buy.
Saves power and floor space.
Can be placed anywhere, regardless of shafting.
Speed of spindles, 4,500 to 10,000 R.P.M.
The Shapers are made for heavy, medium and light work.

Write for facts and figures about this Shaper

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AEROPLANE TO BRING VICTORY TO ALLIES

By GEN. J. M. G. MALLETERRE

THE lull on the French front persists, at any rate so far as it concerns the new German offensive against the British. The British, French and American troops, however, are not inactive. Not only have they stopped numerous German raids aimed at sounding the Allied line, but they have executed brilliant successful detailed operations which show their keenness.

The Americans at Chateau-Thierry, the British in Flanders and the French in the interesting advance they have just made west of Soissons between Ambleny and Cutry show themselves prepared to answer the German attacks.

Ludendorff Must Attack

There is no doubt that Ludendorff is preparing a new offensive. As I said in my last article, he is condemned to the attack through the economic and political situation in Germany. But he must have been embarrassed by the recent Austrian defeat in Italy, by the seriousness of the alimentary crisis in Austria-Hungary, by the Bolshevik troubles agitating Russia and by the ever-increasing difficulties within the German Empire itself. He cannot hope for a sensational surprise like that of March 21 and that of May 27. The Allied high command is on its guard.

It must not be forgotten that Ludendorff still holds the better strategical position and has the greater facilities of manoeuvre for attacking masses.

Big battles are to be expected in the summer months. Where will they take place? Perhaps on every front. But one must look attentively to certain rivers exercising attraction for the Germans—the Marne, the Oise and the Meuse.

Activity in the Air

Ludendorff must be hindered in his plans by the Allied aviation forces. The communiques speak of incessant bombardment of the German rear lines. Yet they do not say everything that could be told. It must be admitted that German aviation does the same behind our lines. They always take advantage of the night. In daylight German aviation is completely handicapped. Its activities have carried the enemy even to Rouen, and its bombers have attacked without respite the Channel ports and towns bordering the front.

Gothas have returned to bomb Paris, making the forty-sixth raid. London, however, has fared even worse.

Aviation is playing its role, and there is no reason to cry out against barbarity nor for reprisals. Barbarity and reprisals are old newspaper stories.

This war, as the German war doctrines made it, is founded on terror and extermination. The Germans showed this in the first days of the Belgian invasion. The Germans still imagine after four years of war that they can terrorize and demoralize armies and nations by using all kinds of destructive power and by barbarous treatment of prisoners and populations of invaded regions.

More and More Terrible

The role of aviation has grown during the war through the technical progress of fabrication. The aeroplane is becoming every day a more and more terrible fighting weapon. Aeroplanes can be divided into three classes, chase, reconnoitring and bombardment. In its last named category the aeroplane has become a decisive factor in the war. With machine guns and small cannon it takes part in the fighting as much as the soldiers, as was seen in the last battles in Picardy, when escadrilles held and even scattered enemy columns and convoys.

With the ever increasingly dangerous bomb, the aeroplane carries the war far into the enemy's country, destroying stations, railways, places where troops are concentrated, and munition factories. This is not a case of reprisal. This aeroplane action is part of the battle, is on the battlefield itself and the lines of communication.

There is no doubt of the superiority this intervention will bring to the high command, which knows how to handle it to certain victory. The Germans have pretended to extend the reprisal question in bombarding regions outside of the army zone. They naturally protested when Allied aeroplanes attacked the Rhine cities. We recognize their usual duplicity and perfidy.

We will not reopen the question proving them the first to start the bombing, so to speak, of open cities. Taubes were seen flying over Paris in 1914. London was attacked in 1915. Paris and London, the Germans say, are military objectives. We agree. Unhappily they are within reach of bombardment, since the invasion of Belgium and France.

Carry War to Germany

Germans had hoped the distance of the Rhine cities would preserve them from the Allies' attack. Being invaders, they felt certain they would be immune from invasion. Aviation at last has carried the war into Germany. When bombardments sow destuction, death and terror beyond the barricades the enemy believed impossible, they are not waging war on "inoffensive" people.

Italian aviators are doing the same on the Venetian front.

Let us not forget that it was through invasion that Germany got the mines from us in Northern Lorraine with which she keeps up the fight. Munition factories all over Germany, wherever one can strike her, will be legitimate in the terrible game of war.

For the moment Allied aviation is most active in the battles themselves. This is necessary. But the day is not far off when it will be extended with formidable efficacy to German soil. Then the end of the war will be near.

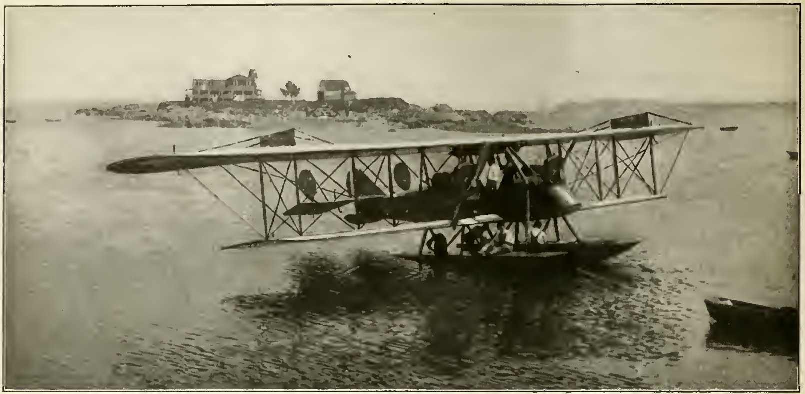
When to the admirable American soldiers shall be added innumerable escadrilles, the Allied high command will show to the Allied peoples as well as the German people why it was patient, and why without too hasty a reply it has put up with Ludendorff's offensives. It knows victory is in the hands of its soldiers and on the wings of its aviators.

American Airmen in France

Dispatches from the American Front in France concerning July 5th, indicate that there was considerable activity in the air on that day. Three German machines were brought down by Americans. Credit is given for their destruction to Lieuts. John Witchell, R. A. O'Neill, J. C. Raihle and D. W. Cassard. It is reported that the destroyed German machines were part of the famed Richthofen "Circus." Photography and reconnaissance was carried out successfully. Two American aviators, Lieuts. W. D. Rohbens and John Wilford, were brought down in flames.

Flying Field Named in Honor of Col. Bolling

Washington, July 5.—The army flying field in this city, which serves as the terminal of the New York-Philadelphia-Washington aerial mail service, has been named Bolling Field, in memory of Colonel Rynal C. Bolling, of New York, who was killed in action in France during the German drive last March.



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Members of the Manufacturers
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High Class Men of Engineering Experience Wanted

The following letter from Major Torney speaks for itself:

From: Section of Gauges and Standards, Bureau of Aircraft Production.

To: AERIAL AGE WEEKLY.

Subject: Advertisement.

1. *The Section of Gauges and Standards of the Bureau of Aircraft Production is in need of high-class men who have had engineering experience, preferably along mechanical lines.*

2. *The nature of the work is in connection with the establishment of standards and the production of gauges and small tools used in constructing aeroplanes, engines and materials pertaining thereto.*

3. *This is an excellent opportunity for men who are anxious to serve their country—to do their bit—and this call cannot help but appeal to men of high character and attainments.*

4. *Anyone desiring to make application can obtain all necessary information from the Section of Gauges and Standards, Office, Room No.* 2610, 165 *Broadway, New York City, on Monday, Tuesday, Wednesday or Thursday, the 8th, 9th,* 10*th and* 11*th instants.*

By direction of the Director of Aircraft Production.

(*Signed*) H. W. TORNEY,
Major, A. S. Sig. R. C.

Flying Bombing Planes Across the Atlantic

(Editorial in the New York *Times*)

The short cut to an acceptance by the War Department of Mr. William H. Workman's plan to build 10,000 Handley-Page bombing aeroplanes and fly them over the Atlantic to the western front is to take across at once, or as soon as arrangements can be made, one of the most powerful standard planes made by the British company. An exhibition plane (British in design and American in construction) made its début with striking success at Elizabeth, N. J., on Saturday afternoon in the presence of Assistant Secretary Crowell and Mr. John D. Ryan, head of the Aircraft Production Board. With a wing spread of 100 feet, and driven by twin Liberty motors of 400 horse power, this great machine, carrying six persons, one of them Major Gen. William L. Kenly, Chief of the Department of Military Aeronautics, functioned as smoothly as a scout plane and attained a speed of ninety to one hundred miles an hour. Well might Assistant Secretary Crowell call it "a magnificent performance." And it was particularly a triumph for the Liberty motor, which is so well thought of in England that the makers, it is said, will never be able to deliver enough of these engines to our ally. But the question remains, could the Handley-Page bombing machines be flown across the Atlantic—let us say, in flocks? And if that were practicable, would it pay? Every hour of the life of an aeroplane motor on the western front is precious. It has been said that, while some motors have lasted 300 hours in operation, the average is very much lower. Mr. Gutzon Borglum says that "the life of an engine is somewhere between 50 and 150 hours." The wear and tear of a forty-odd hours' flight from America to France should not be disregarded by the enthusiasts. Whatever it was, it would be saved by transportation in the usual way. A ship carrying planes and engines might be torpedoed, it is true; on the other hand, some of the bombing machines attempting the Atlantic passage would never reach the other side.

Mr. Workman is indignant because the War Department is cool toward his project. It cannot be indifferent to his bombing plane as a terrible war weapon; certainly not after the exhibition given at Elizabeth. Seeing is believing; and then it is well known that the British planes are playing havoc by dropping tons of explosives every day behind the German lines; railway stations are dismantled, supply trains wrecked, ammunition dumps blown up, troop concentrations stopped, and on the coast submarine bases shattered. The War Department is familiar with these facts, and wants all the bombing machines it can acquire and as quickly as deliveries are practicable. And, of course, it is mainly on the western front that these destructive machines are wanted.

"Thousands of Bombing 'Planes"

(Editorial in the New York *Tribune*)

At the launching of the huge Handley-Page bombing 'plane, built at Elizabeth, N. J., Mr. John D. Ryan, the new head of the Aircraft Production Board, made this terse observation:

"I am glad to say that thousands just like this one (the Handley-Page)—one of the most powerful ever built—are under construction, all to be driven by the Liberty motor, the best and most powerful aeronautical engine ever built."

This new machine is equipped with two Liberty motors, developing together over 800 horsepower. It is a companion to the type of machine that last fall, under the guidance of an American pilot in England, carried a total of twenty-one passengers to a height of 7,000 feet. It will be able to carry, besides two pilots and perhaps two gunners, a matter of a ton and a half to two tons of explosives.

Note that Mr. Ryan says that "thousands of 'planes" like this are being built. The new head of the air board has been notably reticent in any expression of opinion since he took office. Mr. David Lawrence, the correspondent of The *Evening Post,* observes that Mr. Ryan has for three months refused to say a word as to the work or plans of his department.

"He made a thorough study, however, of the happenings prior to his own appointment, and satisfied himself as to the truth or falsity of the public criticism. What Mr. Ryan says when he speaks thus is in a sense judicial, and on his statements the country can base its judgment about the status of the programme to-day and the outlook for the future."

Obviously, Mr. Ryan would have no wish to prejudice the report of ex-Justice Hughes on the work of the aircraft board, which is now in preparation. It is significant that he gives his unqualified indorsement to the Liberty motor as "the best and most powerful aeronautical engine ever built." In this he but repeats what he said the other day at Detroit.

We apprehend that the day is not distant when the achievements of the aircraft board, so scandalously maligned, will come to rank with the shipbuilding work as perhaps America's greatest contribution to the war. It is evident enough that only an intensive and splendid work could, after a single year, make possible quantity production of the best and most powerful aeronautical engine ever built.

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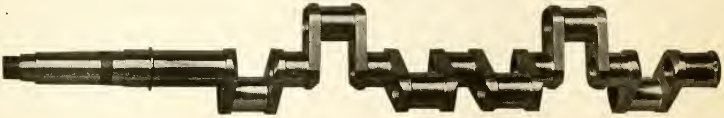

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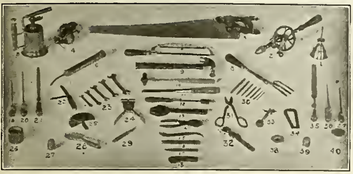

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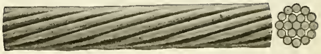

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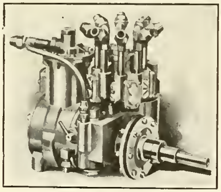

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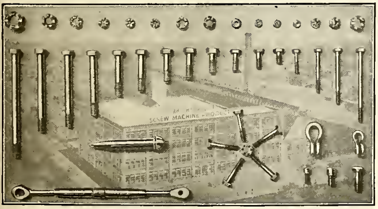

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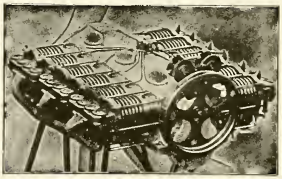

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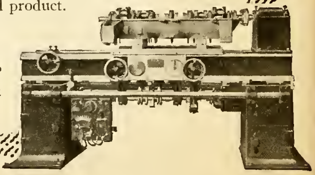

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AERIAL AGE WEEKLY

Vol. 7, No. 19 JULY 22, 1918 10 CENTS A COPY

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An evening flight at one of the American training fields

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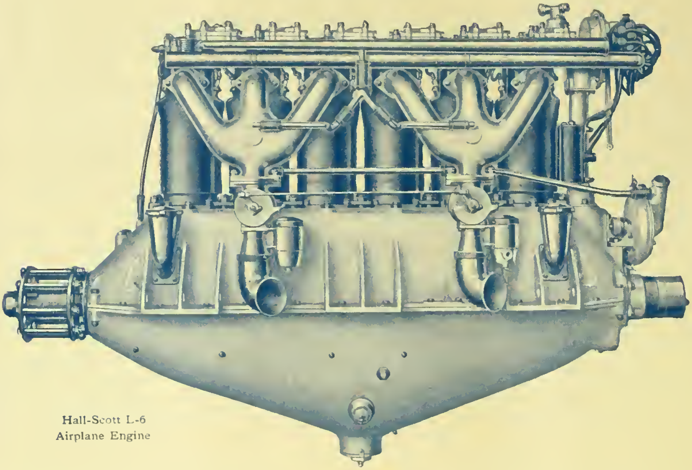
German Drive Shows Need of Thousands Additional Warplanes

HALL-SCOTT



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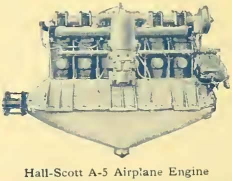

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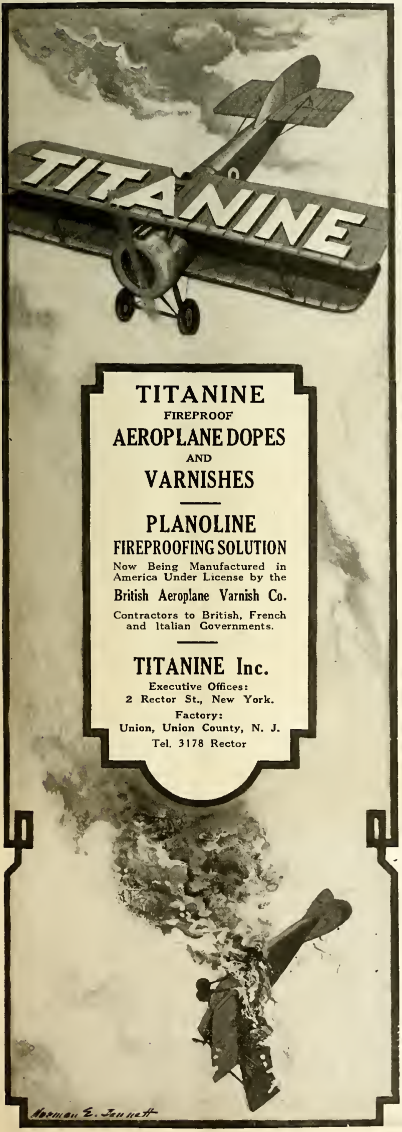

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AERIAL AGE
WEEKLY

Vol. VII JULY 22, 1918 No. 19

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TEXTBOOK OF

MILITARY AERONAUTICS

With a foreword by Alan R. Hawley, President Aero Club of America

By HENRY WOODHOUSE

Author of "Text Book of Naval Aeronautics," etc. Member Board of Governors, Aero Club of America.
Member National Aerial Coast Patrol Commission, etc., etc.

Chapter Headings

The War to be Decided in the Air.
The Warplane for Bombing and Torpedo Attacks.
Dropping Bombs from Aeroplanes.
Battleplanes and Aircraft Guns—The Dominant Factors in Maintaining the Supremacy of the Air.
The Fundamental Principles of Aerial Combat.
Directing Artillery Fire by Night and Day Signaling to and from Aircraft.
Kite Balloons the Eyes of the Artillery.
Aero Photography.
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VOL. VII NEW YORK, JULY 22, 1918 No. 19

GERMAN DRIVE SHOWS NEED OF THOUSANDS ADDITIONAL WARPLANES

THE German drive shows the need of thousands of additional warplanes. With additional bombing planes the transportation of additional German troops and supplies could be prevented by wrecking the bridges on the Rhine and keeping them down, so that German railroads could not operate. The transportation and concentration of troops and military supplies and military formations behind the lines could also be prevented.

An idea of what can be done provided the Allied aviators have the aeroplanes is given in the following despatches:

London, July 13.—British airmen continue to show their superiority over the Germans. After their record of last week, when they accounted for 218 enemy machines against 56 of their own and dropped 252 tons of bombs on German communications and depots, they made this week fourteen separate raids into German territory, their objectives chosen being of vital military importance.

It is known that formidable squadrons have been detailed for the purpose of defense. Yet from thirteen of these fourteen raids the British formations returned without the loss of a single machine. In the other raid two British machines were reported missing, while four German aircraft were shot down or driven down out of control.

The raided area between Mannheim and the Swiss frontier contains a vast network of strategic railways and a very considerable number of munition factories. These factories have had their full share of attention from the British raiders, but hardly less serious, from the German viewpoint, is the damage inflicted upon railway connections on which the immense German transport from the Rhine to the western front depends. On this point the evidence of captured documents and the voluntary testimony of prisoners and repatriated civilians are highly instructive. Not only is a great and ever-increasing amount of German energy and trained man power and war material being diverted to the defense of the Rhine towns, but the interruption of war work is becoming an increasingly serious problem.

Paris, July 15.—The first day of the offensive was a big defeat for the enemy, says the Havas correspondent on the French front.

French aviators were very active in harassing the enemy and destroyed two bridges loaded with German troops.

Our Allies are doing and have been doing everything they can to increase their air service; they have gone as far as their resources permit. It is now up to the United States to do likewise.

We know that to keep an aviator in the air in the war zone we must supply him with an average of one machine per month with spare motor and spare parts.

We also know that to meet the situation in its fullness we must aim to keep at least 5,000 aviators on the fighting lines, which means supplying 5,000 warplanes each month, or a total of 60,000 war planes in a year, as pointed out by Mr. Henry Woodhouse in his testimony to the Senate Committee on Aeronautics last week.

Fortunately we now have the organizations and the funds carry out such a program. The Department of Military Aeronautics and the Bureau of Aircraft Production have gotten together in their staffs some very able and energetic men who are ready to take care of a program several times larger than the present program.

* * *

On July 15 Secretary Baker announced that 450 American-built battle planes had been sent abroad or delivered at ports for shipment on July 5, the date of the latest complete official report reaching the War Department.

In announcing this figure Secretary Baker disclosed also that deliveries of Liberty motors of all classes on the same date had reached 2,514.

* * *

The appropriation bill signed by President Wilson on July 1st carries close to one billion dollars for aircraft. It may be said that the appropriations are unlimited. Both Houses of Congress are ready to vote any amount that can be shown to be necessary for the building of our air forces. Like the American public as a whole, Congress is willing to do anything to assist the building of our air forces.

BRITISH IN A YEAR DOWN 4,102 PLANES

BRITISH LOST 1,121 CRAFT

American Output Expected to Give to Allies Great Advantages from Command of Air

A dispatch from London giving a summary of aerial operations says: During the year ending June 30, 1918, 2,150 enemy aircraft were destroyed by the Royal Air Force on the western front while 1,083 enemy aircraft were driven down out of control. The Royal Air Force units, working with naval airmen, shot down 623 enemy aircraft.

During the same period 1,094 British machines were reported missing, including 92 which were working with the navy.

Thus in the north during the year the British aviators alone have accounted for no fewer than 3,856 enemy machines.

On the Italian front during the period from April to June of this year the British destroyed 165 enemy machines and drove down six out of control. The British machines reported missing were thirteen.

On the Saloniki front, between January and June, twenty-one enemy aircraft were destroyed and thirteen were driven down out of control. The British machines reported missing were four.

From March to June in Egypt and Palestine twenty-six enemy aircraft were destroyed and fifteen driven down out of control. Ten British machines were reported missing.

Thus, during the present year, in these outside theatres of war 246 enemy aircraft were accounted for, while 27 British machines were reported missing.

From July 1, 1917, to June 30, 1918, therefore, the British brought down 4,102 enemy aircraft. The British machines missing number 1,121.

One fact emerges clearly from the record of aerial operations, and this is that the British superiority and strength in the air in all the theatres of war have progressed rapidly and continuously. From this it should be safe to assume that when the new factor of America's output, both of aircraft and personnel, begins to enter into the situation actually in the fighting zones, the aerial ascendency of the Entente Allies should give them very great advantages.

$50,000 TRANSATLANTIC FLIGHT PRIZE RENEWED

FOLLOWING the offer of a $10,000 trans-Atlantic flight prize by the Aero Club of America, the London *Daily Mail* has renewed its $50,000 prize for the same purpose. The cable announcing the renewal was received on July 15 and reads as follows:

"In order to stimulate the production of more powerful engines and more suitable aircraft," the "Daily Mail" announces the revival of its offer of a prize of £10,000 to the first person who flies across the Atlantic from any point in the United States, Canada or Newfoundland to Great Britain or Ireland, or vice versa, in seventy-two consecutive hours.

The original offer of the *Daily Mail* was made in April, 1913. It was suspended at the beginning of the war.

40 Army Aviators Ask Permission to Be in the First Fleet to Cross the Ocean

Forty American aviators of the First Provisional Wings unit at the army aviation field at Mineola, rated as the best-trained pilots in service on this side, on July 15 presented to their commanding officer a petition requesting that they be selected to fly the first fleet of American-built Caproni or Handley-Page bombing machines across the Atlantic under the plans proposed by the makers of both types of aeroplanes. These are the same men who thrilled the city by their skillful flights in battle formation on July 4 and Bastile Day, and who have been enacting sham battles at many places.

In addressing the aviators upon their proposal, Major C. K. Rhinehardt, commanding officer of the aviation field, said that he believed that the plan of flying aeroplanes from America to Europe was feasible, and he added that he believed the flight would be undertaken before the end of the year in planes built in America and equipped with the Liberty motor. He told them that he wished to make the flight himself, and that he was desirous to have his name added to the list of Americans volunteering for service in the first overseas squadron. It is probable that the petition, with the approval of the commanding officers of the field, and with their names added, will be forwarded to the War Department.

Most of the men who volunteered for the flight have received training in the flying of the huge American-built Caproni and similar machines here, and officers at the field said that the men were qualified to fly that type of aeroplane. Under orders they are continuing their study of the Caproni planes here, and it was announced also that a detachment of the men had been sent to the flying field of the Standard Aircraft Corporation at Elizabeth, N. J., to study there the mechanism and flying qualities of the giant Handley-Page aeroplane that was turned over to the War Department with impressive exercises on July 6.

This machine has a wing spread of 100 feet and is propelled by two Liberty motors of 400 horsepower each. Lord Semphill and other expert British pilots will show the Americans every trick of the huge machine and every pilot will make flights in it or in other planes of the type. All of the pilots in the First Provisional Wings will rotate in studying this plane and the Caproni at the army field here.

Major Rhinehardt and other officers at the field said they were sure that the flight would be undertaken within a few months, and that some of the machines in the first fleet would be flown by American aviators, although Italian, French and British aviators attached to the field here are anxious to pilot one of the first planes. He said that the American army officers favored the route from Newfoundland to Ireland, instead of flying to the front by way of the Azores and Portugal. The Americans wish to fly the planes from the factories to Newfoundland, and then make the jump of 1,860 miles to Ireland, and thence to the front. They have suggested also that a string of ships be placed at 200-mile intervals along the route, so that the pilots would be guided accurately in their swift flight and have facilities to repair their planes in case of accidents.

Before his death here two weeks ago Sergeant Gianfelice Gino, the Italian pilot who was instructing Americans in the flying of the big Capronis, asserted repeatedly that he concurred in the opinion of the late Captain Resnati and other pilots that the flight across the ocean could be made, and that no better men for the undertaking could be found than the experienced pilots at the field here with the young Americans who have become expert flyers under their instruction.

The forty pilots in the First Provisional Wings who have volunteered for the flight have all taken long cross-country flights, have been in the air a greater number of hours than have other pilots, and have become expert in the flying of battle and reconnaissance planes, as well as the big Caproni bombing planes. They are the men who thrilled the city with their daring flights on July 4, Bastile Day, flew over the Mitchel cortege, and have been giving demonstrations of air battles.

In sending their petition the Wings said that their request did not lessen their desire to pilot battle planes at the front, and that they were anxious to see service over the lines if it is decided that they have acquired the proficiency in the handling of the bombing planes necessary for the Atlantic flight. Many of them are pilots who have been withheld from overseas service, however, because they had qualities needed for the experimental work with the bombing planes.

Commanding officers at the field expressed great satisfaction that the men under them were anxious to make the first flights across the ocean, and said that the desire to undertake hazardous flights for the good of the service had been typical of all the pilots who have been passed to France through the aviation schools here. In addition to Major Rhinehardt, the men who have volunteered for the flight are Captain S. H. Harvey and Lieutenants F. C. Davidson, M. B. Kelleher, L. S. Reitenbaugh, J. P. Boyd, S. M. Connell, H. C. King, J. I. Hoare, N. E. King, E. J. Rose, H. M. Stoffregen, W. A. Boggs, J. Y. Longstreet, E. S. Muntford, J. W. Meany, J. I. Moore, F. B. Welch, P. F. Hauser, W. A. Henderson, H. C. Garratt, W. Benner, U. G. Jones, Earl Carroll, K. L. Clark, E. K. Merritt, A. H. Halley, B. J. Hanson, J. A. Orb, J. P. Roullet, S. S. Hunt, G. C. Book, J. H. Pearson, D. H. Hinman, A. F. Brokmeyer, M. G. Cleary, J. K. Sherman, L. S. Lockwood, A. H. Krigger, and F. W. Green.

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BY sending one letter a day by aeropost you can contribute directly to increasing the opportunities to train military aviators in flying across country and by dead reckoning, which is the training required to hunt U-boats and to bomb cities behind the German lines.

If a hundred thousand people in the forty-eight States should decide to send a letter a day by aero mail the result would permit extending the aero post service each, west and south and provide continuous training for a minimum of 300 aviators in flying across country and navigating by dead reckoning.

Few people seem to realize that letters can be sent to any city south of Washington by aeropost from New York, making much quicker connection with the regular postal routes and arriving at their destination many hours before mail sent all the way by rail. The same is true of letters sent via Philadelphia to points in the West and also from Washington to New York to points in New England.

Aeroplane mail received at the following postal stations in New York City up to ten minutes before the hours of leaving named below will be delivered in Philadelphia and Washington on the same day as indicated.

	A. M.		A. M.		A. M.		A. M.
G. P. O.	10.50	K	10.25	U	10.20	Hud. Term	10.45
A	10.35	L	10.20	V	10.30	M. Sq.	10.30
B	9.47	M	9.52	W	10.25	Penn Ter.	11.15
C	10.35	N	10.30	X	8.49	Times	10.40
D	10.20	O	10.35	Y	10.30	Tomp	9.40
F	10.30	P	10.20	College	10.05	Tremont	8.06
G	10.35	R	8.43	Fox	8.26	Wall	10.20
H	10.25	S	9.53	G. Cent.	10.55	Wash.	9.46
I	10.20	T	8.35	H. G.	10.00	W. F.	8.15
J	10.20						

If you receive business letters from Washington or Philadelphia in the morning, at the beginning of a business day, you can answer them immediately and by mailing the letter at any of the stations given in the accompanying table before the time of closing the mail at that station, your letter will be delivered in Washington or Philadelphia in time to allow business men or government officials to answer you the same afternoon and you will receive the answer the following morning.

The aeropost will do away with sending special couriers to deliver important mail or legal papers, plans, specifications, etc. The postal authorities can arrange to make delivery of mail immediately upon its arrival at Belmont Park to the firm's representatives, if they so desire.

By adding an aerial mail route from Washington to Chicago, by way of Wheeling, W. Va., and Lima, Ohio, one day can be saved in the delivery of mail in the Middle West, and a similar saving can be effected in the reverse direction. Letters mailed in the West and South, bearing an aeroplane stamp will reach their destination almost two days ahead of the regular mail matter. The time of mail delivery will be cut down further by the establishing of routes from New York to Boston, and from Philadelphia to Pittsburg, Cleveland and Detroit, connecting the industrial centres of the country.

These routes will be added as soon as the number of aeropost letters is large enough to justify the step. You can make it large by sending one letter a day by aeropost.

The cost for this service by aeroplane at present is only three cents (3c) an ounce. Ten cents (10c) is added for special delivery service, and three cents (3c) regular postage, making sixteen (16c) an ounce in all, and with a greater volume of mail it is possible that this rate may be reduced.

The performance of the aero mail carriers between New York and Washington has been such as to warrant the hearty co-operation of all business men and firms, and especially those interested in aviation.

THE NEWS OF THE WEEK

Progress of Aircraft Program

A summary of the developments of the military Establishment of the United States in the fifteen months since Congress declared war against the Imperial German Government is given by Secretary of War Baker in a letter to Chairman Dent of the House Committee on Military Affairs, dated June 28, 1918, and made public on July 4. The letter was in reply to one from Mr. Dent of June 27, reminding the Secretary that just a year had elapsed since the first American troops were landed in France, and suggesting such a statement. Regarding aviation Mr. Baker gives the following facts and figures:

Deliveries of elementary training planes to June 8 were 4,495.

Deliveries of advance training planes to June 8, 820.

The average weekly production of advanced training planes during April was 22; during May, 45; week ended June 8, 78.

To June 8, 285 combat planes were delivered. The weekly average of this type of machine in April was 5; in May, 38, and for the week ended June 8, 80.

Six thousand eight hundred and eighty training engines were delivered to June 8.

Two thousand one hundred and thirty-three advanced training engines were delivered to same date.

More than 2,000 Liberty engines have been delivered to the army and navy. The average weekly production in April was 96; in May, 143, and in the first week in June, 115.

Thirty-seven thousand two hundred and fifty machine guns were delivered for use on aeroplanes before June 8.

Call 3,000 Draft Men for Spruce Wood Corps

Washington, D. C., Friday.—Provost Marshal General Crowder to-day issued a call for an additional 3,000 men from thirty-eight States to produce spruce wood in the forests of the Northwest for airplane construction. From Class 1 only men who are qualified for special or limited service will be accepted. These, as well as registrants in the second, third and fourth classes qualified for general military service, may volunteer until July 23.

Aeroplane Plant for Y. M. C. A.

General Irenée du Pont, on behalf of the Delaware Aeronautic Company, has offered to the School of Aeroplane Mechanics of the West Side Branch of the Y. M. C. A. the entire plant and equipment of the aeroplane plant at Claymont, Del., which includes machinery and several aeroplanes. He has already given the school an aeroplane.

Air Officers Must Fly

Washington.—Only officers who have qualified as junior military pilots hereafter will be given appointments in the military aeronautic division, under a ruling by Major General Kenly, director of the reorganized air service.

At present there are many officers in the non-flying branches of the service, which includes all administrative and staff work, and plans are afoot requiring all officers now on such duty in Washington to learn to fly. A flying field being established near the city probably will be used for this purpose. The flying qualification rule applies only to the operating end of the air service. It does not include officers of the aircraft production division.

Used Carrier Pigeons

Trenton, N. J.—Lieut. George Leisure of New York City, piloting a Curtiss biplane, accompanied by two other aeroplanes, from Mineola to Princeton, fell on the farm of John M. McDonald, a New York banker.

In falling Lieut. Leisure managed to manipulate his plane so that he escaped death, although the machine was badly wrecked. His face was badly bruised. He released a half dozen carrier pigeons and started them on their way back to Mineola, telling of the mishap.

Belgian Rulers Fly Over Channel

London.—Guarded by a royal air escort of three Belgian seaplanes, King Albert and Queen Elizabeth flew over the Channel from Belgium to England on July 6th on a trip which marked the first time in history that any ruler has ever made a flight from one country to another. The Royal couple traveled in separate seaplanes, each operated by a Belgian army aviator.

On the British side of the Channel the King landed first near a British warship off Dover. The Queen descended soon afterward, her seaplane also landing near a warship. They started from the Belgian coast and made the trip to England in about fifty minutes. The purpose of their visit to England was to attend the silver anniversary of King George and Queen Mary on Saturday.

This is the first time since the war began that King Albert has visited London and virtually the first time since August, 1914, that he has been outside his native land.

Invent New Camera

Allied airmen are using a new multiple camera, a development of the motion picture camera. Thousands of pictures at the rate of one per second can be taken. With a single loading, 750 exposures can be made, and the film for a new exposure is turned automatically. Precision in the mapping of enemy lines is now possible.

Capt. Boyriven Flies Under New York Bridges

French and American aviators celebrated the French national holiday on July 14th with aerial manoeuvres, which would have been much more elaborate but for the rain which fell in the late afternoon. Captain A. J. Boyriven, a French instructor attached to the aviation field at Mineola, opened the day's program with the performance of an aerial feat which had never been performed before—flying under all four of the bridges over the East River in a single flight. He flew with a mechanic in a big, fast machine, an American built de Haviland, equipped with a Liberty motor, and he made the trip at an average of about 140 miles an hour.

Leaving the Mineola field shortly before 8 o'clock he flew across Queens and came out over the East River above the Queensboro Bridge. He flew carefully down along the river, reconnoitering to make sure that there were no boats in the way which might interfere with him as he flew under the bridges, and then turned as he got over Governor's Island, swooped down in a long diagonal and shot under the Brooklyn Bridge about half way between the roadway and the water. As he flew he broke out a French flag beneath his machine, and his mechanic waved a hand at a patrolman standing on the bridge.

The same dash carried the machine on under the Manhattan and Williamsburg Bridges. Then Captain Boyriven rose a little, made a sharp turn following the line of the river, and dropped again and shot under the Queensborough Bridge, rising as he came out and turning back toward Mineola.

An elaborate program had been arranged for the afternoon, including flights and manoeuvres over the city by squadrons of American flyers from the Mineola field, and a flight to Westbury, where a great parade and open-air demonstration was being held by another squadron. Captain Boyriven led a group of American flyers to Long Beach at noon, where they performed evolutions over the boardwalk crowds; and later the same group made a flight, diversified by stunt flying, over Rockaway and Coney Island.

For half an hour or more, shortly after 8 o'clock last night, a dirigible balloon soared about 800 feet above the vicinity of Times Square, displaying from the pilot basket the Tricolor of France.

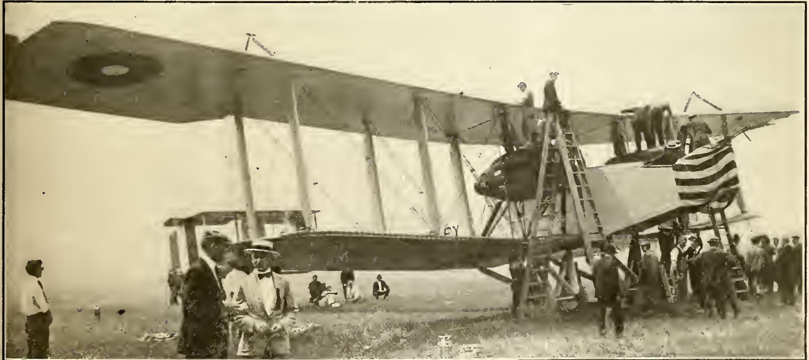
Pigeons Wear Gas Masks

Gas masks are not only worn by human beings, but carrier pigeons are the latest to come under the ban. Even food containers are put through a paraffine bath and hermetically sealed so that they can be carried through the gas zones at the front.

Chicago Aviator Escapes German Prison on Sixth Attempt

London.—Everard Buckley, of Chicago, who was captured by the Germans at Verdun in September, 1915, when he served as an aviator with the French, has at last made good his escape from the German prison camp where he was detained.

He had made five previous unsuccessful at-



The Langley—the American-made Handley-Page bombing machine—which was christened on July 6. Account of the christening appeared in the July 15 issue of Aerial Age

tempts. Buckley has reached Switzerland, according to a Central News dispatch from Schaffhausen.

Uninjured Prisoners

A note dropped by German airmen on the Toul front contains the information that Lieut. G. A. P. Hyler (G. A. Phyler?), Lieut. B. B. Battle of Columbus, Ohio, and Lieut. J. Williamson of California, missing American airmen, are uninjured and held as prisoners.

Meissner of Brooklyn Latest American Ace

Lieut. James Armand Meissner of Brooklyn is the newest American ace. Two additional victories, officially confirmed, won him the honor, making his total now five. Following the bringing down of a German aeroplane last May the Croix de Guerre was awarded him.

Lieut. Goodale, observer, and Lieut. Noyse, pilot, attacked by six German airmen, brought one down and escaped from the others.

5 American Fliers Decorated by King for Work in Italy

A dispatch from Italian army headquarters says:

"The exploits which brought five American airmen decorations cannot yet be published, but the value of their services may be judged from the fact that King Victor Emmanuel traveled to the section held by the Americans to personally make the presentation.

"All the Americans are doing splendid work, more than justifying the confidence placed in them when their presence on the battlefront was requested by the Italian supreme command, and they were selected by Capt. Fiorello La Guardia, the representative from New York, who is now attached to the United States Aviation Corps."

Two American Aviators Killed in France

Paris.—Alan Ash, of Chicago, a member of the Lafayette Flying Squadron, has been killed in a combat with several German machines over Soissons. His machine when falling was seen to burst into flames.

Warren T. Hobbs, of Worcester, Mass., another member of the squadron, was killed on June 26. Forced to fly low because of engine trouble, he was brought down by anti-aircraft guns.

Lieut. James C. Ashengen, of the American Expeditionary Forces, has been interned in Switzerland. He was forced to land in Swiss territory on June 25 because he ran out of gasoline.

Mail Flyer Photographs Aerial Postal Route

Moving pictures were made from the air of the route of the aerial mail men between New York and Philadelphia. Similar pictures will be made of the line from Philadelphia to Washington. The camera man was Lieutenant T. H. Webh, who also flew over the line of the parade in Manhattan on July 4th and trained a moving picture camera on the scene below.

Air Mail Regular Now

On only one day in the last three weeks was it necessary to suspend operation of the aero mail route between Belmont Park and Philadelphia. That was because of bad weather. The southern leg of the route, between Philadelphia and Washington, was operated on that day, however.

Aeroplane mail was carried from Washington to New York on July 10 in two hours and a half, including the stop at Philadelphia.

The average rate of speed for the entire trip was over 90 miles per hour; and that between Philadelphia and New York was 105 miles per hour. Lieut. Dodge left Washington at 11.28 a. m., with 211 pounds of mail, arriving in Philadelphia at 1 p. m., making the distance of 135 miles in 1 hour and 32 minutes. Lieut. Miller left Philadelphia at 1.08 p. m. with 134 pounds of mail, arriving in New York (distance 90 miles) at 1.58 p. m.

The mail from New York arrived at Washington at 3.30 p. m., flying through the storm.

Increasing familiarity of the flyers with conditions attending the flights has resulted in a considerable shortening of the average time. The direction of the compass is compared with the chart every ten minutes during the flight and at each of the larger towns on the route. In this way the route through the air has been accurately charted.

From the Flying Fields

Fort Worth, Tex.—Taliaferro Field at Hicks, twelve miles north of this city, is now the largest as well as the oldest of the schools of aerial gunnery in this country. The Royal Flying Corps started the work on the range last winter and the American air service has greatly enlarged the field and facilities. Leases have just been signed for a tract of 11,700 acres just west of the aerodrome. This is rolling country and will be used as a range. New hangars are being erected and much building is going on all over the post.

Many novel features mark the work of the school. Among them is the Reinburg water target, the invention of Maj. George E. A. Reinburg, the commanding officer. This consists of a basin of water the exact size of a plane which is surrounded by a circle of lime dust. By this clever device shots are easily spotted, direct hits by the splashes of water and close shots by the puffs of white dust. Another interesting device is the cloth tow target, trailing behind a big plane, painted white with black crosses to simulate a German machine.

Carrier Pigeon Training at Chanute Field

The training of carrier pigeons at Chanute Field, near Fort Worth, Texas, which was started a short time ago, is meeting with exceptional success. At the present time there are about seventy-five young birds being trained there. At the beginning of their training they are taken out by motorcycle and turned loose at distances varying from one mile to fifteen miles from their home loft. After this they are taken up in a plane and set loose at quite a long distance from their lofts. So far, none turned loose in this latter way have failed to return, though some of the first flights have shown that all carrier pigeons are not capable of getting back safely.

Sunday Outings Originated by Captain Taylor Are Popular

The most popular recreational feature at Ellington Field, judging from the opinions of the men themselves, is the regular Sunday afternoon outing. This idea was inaugurated by Captain Miller R. Taylor, of the 189th Squadron, who took his men on a fishing trip several weeks ago and enabled the men to have a holiday with little expense to themselves.

Since then, the various squadrons, in groups of two or three, have enjoyed these Sunday excursions. The men are taken in trucks to some lake or seaside resort. Swimming, fishing, boating and baseball are the sports engaged in. The jolly singing of the men on their return trip shows beyond all doubt that they have thoroughly enjoyed the trip.—Ellington Field News.

Gosport System of Flying to be Taught

Lieut. Thomas L. Rouse has been appointed head of the Gosport instructor's school of the Flying Department at Kelly Field, Texas. The principal feature of the new system is that instead of having different instructors at the various stages of flying, a cadet will be under the instruction of one man until he has been developed into an accomplished flier.

Capt. Roy N. Francis, executive officer of the Flying Department, explains the advantage of the Gosport training by stating: "The instructor will be able to familiarize himself with the individual, his peculiarities and his faults, and in this way he will be better able to correct them. He will develop the cadet himself and will turn out a better flier, who will be more rounded out.

Cadets Will Benefit

"Being under the observation of one man, at all times, the cadet will get the benefit of a more personal and intimate touch."

The principal departure from the old system is the installation of speaking tubes by which the instructor in the dual stage can correct the faults of the cadet while in the air. Formerly it was necessary to wait until reaching ground to point out mistakes.

Under the Gosport system, an instructor will have five cadets assigned to him, and these will remain under him until they have learned every angle of flying.

Major McCudden Killed

London.—Major James Byford McCudden was killed accidentally in France on Monday. He shared with Major Bishop the honor of being the most distinguished British flying man. McCudden had won the Victoria Cross, the Distinguished Service Order, the Military Cross and the Military Medal.

Up to April last he had accounted for fifty-four enemy machines, of which forty-two were definitely destroyed, nineteen of them within the British lines.

(Photo © Com. on Public Information)

First all American made battleplane—the Liberty Battleplane—during the christening ceremony in France. Mrs. Kendall, member of the Aviation Committee of the National Special Aid Society, performed the christening, which was attended by the Allied authorities

Ensign Roe, Naval Air Pilot, Captured

Washington.—Ensign George Roe, of Scituate, Mass., an aviation pilot in the American Navy, has been captured and is imprisoned at Camp Landschut, Germany, the Navy Department was advised on July 5 by Vice-Admiral Sims.

Down Two German Planes

American pursuit planes on July 11th interrupted German observation and photographic work behind the American lines.

Lieutenants Edgar Tobin of San Antonio and Edgar Jones of Chicago attacked a biplane over Flirey (northwest of Toul) at an altitude of 3,000 yards. They dived after him four times, down to 1,000 yards, when he fell over Thiaucourt.

Lieut. Charles T. Merrick of Eldora, Iowa, attacked another biplane north of Flirey. The German went sliding down on his wing, and was reported later by another American flier as having fallen in flames.

Pursuit planes also attacked the enemy's observation balloons, which were hastily pulled down.

Lieut. Quentin Roosevelt, youngest son of former President Roosevelt, brought down his first German aeroplane in a fight north of Chateau-Thierry.

Putnam of Brookline is Foremost U. S. Ace

Paris.—Lieut. David E. Putnam of Brookline, Mass., has formally become the leading American ace in succession to Lieut. Frank Baylies, who has been missing since June 17. Puntam's tenth victory on June 30 now has been verified officially. In June Putnam brought down seven German machines, equalling monthly records made by the late Capt. Guynemer.

Hitchcock, Jr., Made Lieutenant by French

In recognition of his victories over German aviators before he fell within the enemy lines and was made a prisoner, Sergeant Thomas Hitchcock, Jr., has been made a lieutenant in the French service. Word of the promotion was received by his father, Major Thomas Hitchcock, commander of the training department of the Mineola Aviation Field.

The message said the promotion was made by General Petain for "gallant work" performed by the American.

Houston Business Men Buy Instruments for Ellington Field Band

The instruments used by the Ellington Field Band were purchased from funds contributed by a committee of Houston business men.

The committee worked under the auspices of the Rotary Club of Houston, and, with the money that they raised, the finest grade of instruments were purchased.

Ellington Field appreciates the good will and generosity of the men who have made an excellent band equipment possible.

Daniels Commends Two for Rescues

Washington.—Secretary Daniels has commended Lieut. Commander Lewis H.. Maxfield and Lieutenant Frederick P. Culbert, both of the American Naval Aviation Forces abroad, for their part in the rescue of American aviators who were caught in the wreck of a French dirigible balloon in which they were operating.

In a letter to Lieut. Commander Maxfield, Commandant of a naval air station, who was making a flight in the dirigible to inspect the airship and its crew, Secretary Daniels wrote:

"The courage and resource displayed by you after the wreck of the dirigible, particularly in the rescue of two of your men, are worthy of the gallant traditions of the service to which you belong."

Secretary Daniels has made recommendation to the Secretary of the Treasury that a life-saving medal be awarded Lieut. Commander Maxfield.

Lieutenant Culbert was highly commended for the courage and initiative he displayed in aiding in saving the lives of the two men who were in danger of drowning.

U. S. Aviators Destroy Big Berthas

Paris.—American aviators have silenced all the Big Berthas that terrorized Paris, and now the French capital is enjoying peace and calm. For more than a month the longe-range guns have not fired a shot into Paris.

General Pershing's official communiqué of July 13th by the War Department, describes operations in the various sectors occupied by American troops through July 7 to 10. It reads:

"Headquarters American Expeditionary Forces, July 12, 1918.

"Our aviators shot down a hostile machine. It was brought down near Thiaucourt by Lieutenants Jones and Tobin. As a result of their fire the German plane fell in flames."

A Valueless Precaution

Paris.—The idea that paper stuck on glass windows prevented them from being shattered by the explosion of bombs near by has been exposed as valueless by a government scientist who has just completed exhaustive tests.

Parisians, in the belief that the paper protected the glass, had decorated their windows with miles of paper strips, many more or less artistic designs being evolved.

New Curtiss Battleplane Makes Good in Night Test

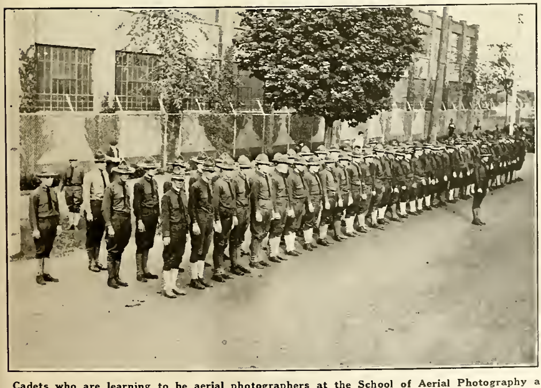
Glenn H. Curtiss and his gasoline engine expert, C. B. Kairkham, recently tested, at the Hempstead Aviation Field, a new battle triplane which developed 150 miles an hour speed and climbing ability of close to 1,000 feet per minute. The triplane carries two passengers and machine guns.

Roland Rolls of Buffalo was the pilot. It is said that both the army and navy will accept the new type of battleplane. Prominent army and navy officers witnessed the initial flight.

More Machine Gun Battalions

Spartanburg, S. C.—Two more anti-aircraft machine gun battalions, to be known as the 4th and 5th Anti-Aircraft Machine Gun Battalions, as are the other anti-aircraft machine gun battalions, are attached to the Provisional Depot for Corps and Army Troops, commanded by Brig.-Gen. Guy Carleton.

The new organizations are in skeleton form, the cadre of the 5th Anti-Aircraft Machine Gun Battalion is being created from men transferred from the casual detachment, Depot for Corps and Army Troops. The officers of the 4th Battalion are: Major Oliver J. Wuane, Capt. David D. Mohler, Capt. Francis F. Painter, Capt. Stephen P. Fuller, First Lieuts. George J. Arendt and Jacob Hauptman, First Lieut. John L. Hurley, Second Lieut. Lloyd J. Arthur and Second Lieut. Lonnie M. Upchurch.



Cadets who are learning to be aerial photographers at the School of Aerial Photography at Rochester

Many Officers Transferred

The officers of the 5th Anti-Aircraft Machine Gun Battalion are: Major George C. Webber, Capt. George L. Caruthers, Capt. Charles R. Willey and Capt. Myron F. Bundy, First Lieuts. Faye G. Prater and Ray Love, First Lieut. John W. Marsh, Second Lieuts. John S. McCleary and Ralph G. Perkins.

Night Flying Important Part of Flier's Training

Ellington Field, Tex.—Future bombing pilots at Ellington Field will have to undergo a strenuous baptism of night flying before they are declared ready for actual service overseas. New courses in advanced night flying have been inaugurated to simulate conditions that the pilot will encounter when he crosses the lines to raid enemy country after dark.

A powerful search light has been stationed to the northeast of the field and each night whips its dazzling path of light to the skies searching out lone ships. It is a game of hide and seek in which the flier is compelled on one night to fly directly into the light and not lose it and on the next night to dodge the blinding tormentor.

Then there will be long cross country flights at midnight which have not been attempted heretofore on any American training fields. After many months of experimentation, officers at this field have rigged up an arrangement for landing flares whereby forced landings will lose their horror.

Radio Squadron to Be Advanced School for Wireless Men

Ellington Field, Tex.—Ellington Field might well be termed the Advanced Field of the United States, judging from the number of advanced schools conducted here. The latest school of this type to be established is the "Advanced School for Radio Operators."

The purpose of this school is to train men who have taken radio school work elsewhere, for actual duty overseas. The course is divided into three sections of one week each and is almost altogether field work. Both French and British systems of working with the artillery will be taught, and the idea is to make conditions as near like battle front conditions as possible. The first two weeks' work will be conducted in dug-outs, just outside of the post, while the third week's work will be in the open, each man being on his own initiative, the work being done with planes. A number of planes will be assigned especially to this work.

Captain Cook, a British officer assigned to duty in this country, has been here, assisting in getting the work started. Lieut. H. B. Lindsay is in charge of the school, Lieut. Fairman is in charge of the instruction, and Lieut. Worrel is in charge of the supplies and maintenance.

Kelly Field to Have Beautiful New Park

Kelly Field, Texas, is to have a park.

The area at the junction of Frio City and Post Headquarters Roads will be graded, covered with grass, and ornamented with flower beds; later in the year shrubs will be used for decoration. A gravel road will be laid from Post Headquarters Road to the road skirting the Supply Depot, and a gravel path will connect the hospital with the Frio City Road.

The American Red Cross will furnish practically all the funds, though all the units benefiting by the improvements will co-operate.

Lieut. Bartlett Breaks Record in Long Flight

Flying from Scott Field, Belleville, Ill., to Payne Field, West Point, Miss., 341 miles, in three hours and five minutes, Lieut. Frank M. Bartlett, Officer in Charge of Flying of Kelly Field, has probably established a new world's record. He covered the 341 miles at an average speed of 110 miles an hour.

The best previous American record for a flight of about the same distance is that made by Lieut. A. Baldioli from Norfolk, Va., to Mineola, L. I., a distance of 330 miles, which he traveled in 2 hours and 55 minutes.

Lieut. Bartlett was favored by a stiff wind, and at times must have traveled at better than 150 miles an hour. The usual time for such a flight is about 5 hours and 49 minutes—that is, a rate of a mile a minute. Lieut. Bartlett nearly cut this time in half.

The AIRCRAFT TRADE REVIEW

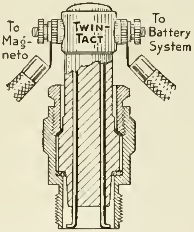
A. E. J.

New Titanine Plant

Titanine, Inc., which was announced as a new $100,000 corporation in a recent issue of AERIAL AGE, has completed the erection and equipment of its plant at Union, New Jersey, and is ready to start production. This company is licensed under the British Aeroplane Varnish Company, owners of all Titanine formulas, which supply about 20 per cent. of the dope used by the Allies. At present the product of the American corporation will be limited to the manufacture of Titanine dope, and Planoline fireproofing solution, while later it will make pigmented varnishes, identification colors, and spar varnish. Titanine dope has been used in the English and French air service for nearly four years, according to E. G. Davis, General Manager of the new corporation. It is fireproof, at least to the same extent as cellulose acetate dopes, and has the great advantage of containing less than one half of the amount of acetone or acetonic substitutes necessary to make the acetate dope, also the solid materials used are waste products of other industries which, of course, means the minimum amount of outside labor. This, together with the great covering power, makes Titanine one of the most economic dopes on the market. Another feature of Titanine dope is the fact that atmospheric changes have no effect upon it, eliminating the tightening and slackening inconveniences as it keeps the tension of planes constant under all weather conditions. Planoline is a fireproofing solution in the form of a thin first coat dope, which when applied under Titanine makes the fabric as well as the dope fireproof. When Planoline is applied under other dopes it makes the fabric able to resist burning, even if the outer surface dope is fired.

Government May Take Aircraft Plants

Washington.—The Senate Aircraft Investigating Committee, according to rumors here, will recommend that the Government take over all aircraft factories and run them under direct official supervision. Discoveries by the committee in some of the factories visited, it is said, has brought the belief that in no other way can aircraft production be put on a basis which will enable it to catch up reasonably soon with the rest of the army. There are also rumors of profiteering by some of the concerns having aircraft contracts with the Government. The committee's report is expected to be made after Congress returns from the summer recess about August 15th.



Twin-Tact Spark Plug

By the use of the Twin-Tact Spark Plug, an automobile, marine or stationary engine can be fitted with two entirely separate systems of ignition, even though there is provision for only one spark plug in each cylinder.

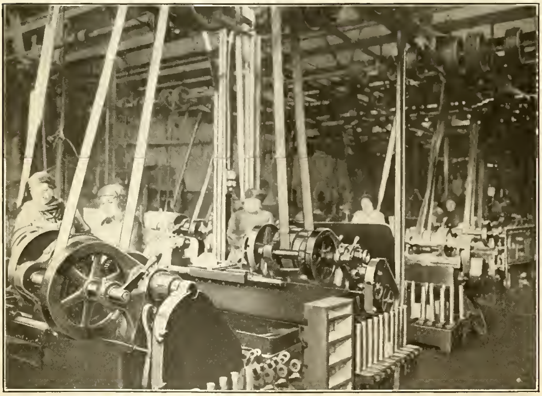
The Twin-Tact Spark Plug is really two plugs in one. It has two separate insulated sparking points, each of which is connected to its own separate insulated terminal post. Therefore, a spark can be obtained from either point.

A magneto may be connected to one terminal post and a battery system to the other, and either system operated independently. Formerly, for separate battery and magneto system, two plugs were required for each cylinder.

Twin-Tact Spark Plugs are manufactured by the Superior Motor Power Company, 135 Fifth Avenue, New York City.

Dividends Declared

The Curtiss Aeroplane & Motor Corp. has declared a regular semi-annual dividend of 3½ per cent on preferred stock, payable July 15 to holders of record July 2.



View of the great French factory of Salmson Engines

Ash Trees for Aeroplanes

The appeal of the Aerial League of the British Empire for ash trees for aeronautical purposes has resulted in between three and four thousand trees being offered, according to *Flight*. The government requirements in the next twelve months are expected to exceed 200,000 trees.

New Material for Aeroplanes

According to a press dispatch from Washington a policy now effective in American aeroplane production is that of supplementing spruce wood supply by using selected timber of other more widely distributed commercial varieties. It is said that exhaustive tests made by the forest service, followed by experiments in construction, have proved that requisite qualifications of strength and lightness for aeroplane building are possessed in varying degree by other woods, notably white pine, and that under orders of John D. Ryan, head of the Aircraft Board, use of them was immediately decided upon.

It is not intended, the technical men say, to displace the invaluable spruce with the other woods except in making the fuselage, finishing the body, the building up sections of the structure like the landing-struts, where the strains and stresses of progress against air resistance do not center. Spruce will still constitute the material for wing spars, struts, between planes, and similar sections where these stresses do center.

Paint and Varnish Makers Asked for Stock Statements

The War Industries Board authorizes the following:

R. S. Hubbard, chief of the paint and pigment section, has sent the following letter to the paint and varnish manufacturers:

"In order to aid in putting into effect the program announced January 21 and March 11 by the Commercial Economy Board, now the Conservation Division of the War Industries Board, all manufacturers are hereby requested to send us an accurate statement as to any stocks on hand July 1 of those items which have been dropped in accordance with its recommendations.

"This statement should be prepared as promptly as possible and include the following:

"1. Complete account of stock of shades or colors, grades, and sizes of packages, which, according to the board's recommendations, will be dropped, and the dates on which these were put up.

"2. Complete account of stock of the unfilled half-gallon cans and smaller sizes which are to be eliminated in accordance with the board's recommendations and the dates when these were manufactured or received."

Women Health Officers for Duty in Munitions Plants

The War Department authorizes the following statement from the Ordnance Department:

Women health officers, whose duty will be to see that the thousands of women workers in munitions plants are kept healthy and their output of war materials thus maintained at the peak of production, are to be trained under the direction of the women's division of the industrial service section of the Army Ordnance Department.

An eight weeks' course of study for a limited number of carefully selected women health officers started Wednesday, June 26, at Mount Holyoke College, South Hadley, Mass. The course is being given under the general direction of Dr. Kristine Mann, health supervisor of the women's branch of the Ordnance Department. The staff of lecturers and instructors includes many well-known specialists in physiology and hygiene, physical education, factory organization, and labor.

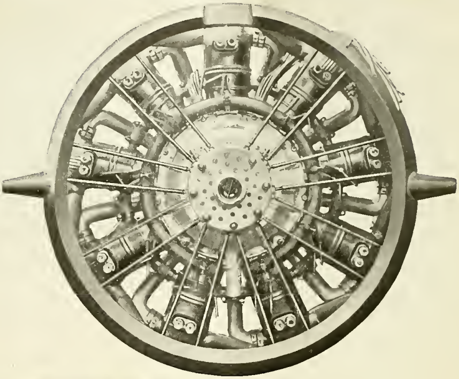
The women who are taking the course are college graduates, or women of equivalent technical education. Almost all have had experience in dealing with working women. The first requirement for admission to the course has been perfect health, and only those have been selected who will inspire wholesome living among the munitions workers.

The work to be done is along entirely new lines. Many of the plants already have physicians and nurses to care for employees when they are ill, but they do not have health experts with a knowledge of the psychology of women workers to do constructive, preventive health work among the women.

Women Do Men's Work Successfully

The unprecedented demands—both military and industrial—upon our country's man power, are fast fulfilling prophecies made at our entry into the war, that when we finally took our place with our allies on a gigantic war basis, women would fill the places of men in our great industrial plants. In the plant of the Goodyear Tire & Rubber Company, at Akron, Ohio, women are now turning out twenty per cent of that company's product.

Many of them are engaged in work that it was thought could not be turned out except by men, yet in actual performance, in much of this work they have actually outdone men. Nearly 3,000 women and girls are now employed in that plant. More than 4,600 men have left the company to enter the federal service—and no factory can lose this number of strong able-bodied men and not miss them. But a thorough trial of women in their places has demonstrated that production will not suffer.



This engine is a product of the great French Salmson Aeroplane engine factory, shown on the preceding page

Two more views of the Springfield Aircraft Factory—one of the latest acquisitions to the American aeronautic industry, who are beginning to contribute substantially to the aeronautical equipment of the American Air Forces

Ryan's Office Moved

Washington.—The office of John D. Ryan, Director of Aircraft Production and chairman of the Aircraft Board, was moved from the Munsey Building to Wing 8, second floor, Building "D," Fourth Street and Missouri Avenue, N. W.

The Aircraft Board has been assigned offices in the Fourth Street wing of the same building.

Production of Spruce and Douglas Fir

Washington.—According to what are called "preliminary final figures" on 1917 lumber production, just issued by the Forest Service of the U. S. Department of Agriculture, the reported production of Douglas fir last year was 5,327,720 thousand feet. This was 96 per cent of the computed production. The reported production of spruce was 975,913 thousand feet, as against a computed production of 1,125,000 thousand feet. The reported production in this case was only 86 per cent of the computed.

Incidentally it may be mentioned that the total lumber cut for the country for 1917 was approximately 10 per cent less than the production in 1916. This is attributed principally to the largely decreased private building operations, the scarcity of labor in connection with small operations, transportation difficulties, curtailment of demand on the part of wood using industries, and a more or less general dislocation of lumber distribution through ordinary channels of trade. A considerable portion of the total quantity produced was utilized in meeting the exceptional demand for Government construction and other war emergency projects, including ship material.

An Allied Naval Aviator flying under a bridge while on patrol duty. Official photo.

TO ASCERTAIN THE SPEED AND DIRECTION OF AEROPLANES OVER THE WATER

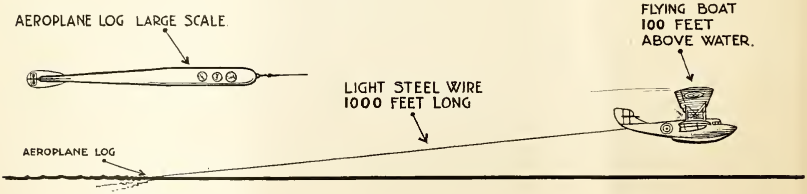
AT the present time, the practicability of flight across the ocean, or across long stretches of water, is greatly handicapped by the fact that if an aeroplane is out of sight of land it is practically impossible to tell the direction in which it is moving over the surface of the earth, and its speed in this direction. The speed and direction of movement of a ship over the surface of the earth are determined by methods of precision, which include methods of determining her speed and direction of motion through the water, the speed and direction of ocean currents, and the exact position of the ship by observations of the heavenly bodies.

Admiral Fiske's proposed method, the only plan proposed so far, seems thoroughly practicable to ascertain the speed and the direction of movement of an aeroplane over the water; the method being based on the idea of making an aeroplane follow the same general procedure as a ship does, and thus take full advantage of the science and the art of navigation.

Up to the present moment, little effort has been made to do this. An aeroplane, in starting to fly, usually rises quite rapidly and high, and soon assumes a height at which the science and the art of navigation are extremely difficult of application. Furthermore, little effort is made to maintain straightness of flight; yet, as you know, the first essential in navigating a ship is that it shall steer a straight course; not only in order that precise information may be had as to what that course is, but also in order that the speed may be reduced as little as possible by the resistance which a rudder opposes when it is put to one side or the other.

The first part of his proposition is that, for long flights over water, an aeroplane should be made to steer as straight a course as possible, not only laterally but vertically.

Another part of Admiral Fiske's proposition is that, for long


AEROPLANE LOG LARGE SCALE.
FLYING BOAT 100 FEET ABOVE WATER.
LIGHT STEEL WIRE 1000 FEET LONG
AEROPLANE LOG

flights, an aeroplane should fly quite close to the water; not higher, perhaps, than 100 feet above it, in order to save fuel and enable the aviator to get information from the water itself as to the direction and length of flight. Another part of the proposition is to get this information by means of what may be called an "aeroplane log."

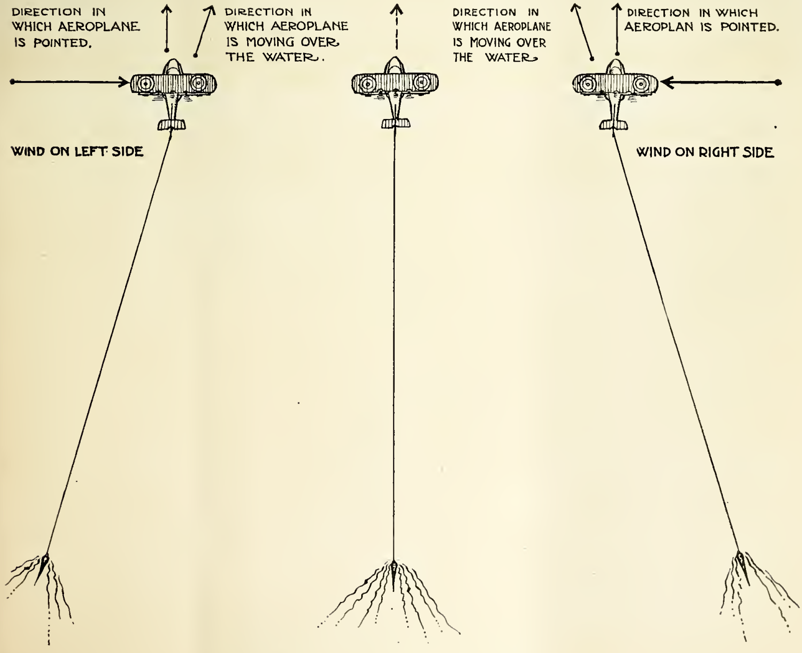
As Admiral Fiske pointed out at the time, the most important information that the aeroplane needs is, not its length of flight, but its direction of flight. This can be ascertained by the simple expedient of towing *through the water* a small object, say a foot long and an inch in diameter, by a long and light steel wire. If the aeroplane is proceeding in a calm, or in a wind which is parallel to the direction in which the aeroplane is pointed, or the reverse, the log will tow directly astern; but if the wind is on either side, the "log" will not tow astern, but will be over on one side or the other; and its direction from the aeroplane will be exactly the reverse of the direction in which the aeroplane is moving over the water. Suppose that you were in an aeroplane going from one port to another, and that your course ought to be north. If you could keep exactly on that course, you would eventually reach your destination, no matter what was your speed (within limits). Suppose, now, that you had out a log such as I have proposed. In this case, no matter what the direction of the wind was, all you would have to do would be to steer the aeroplane continuously in such a direction that the log should bear south from you.

If the aeroplane steers a steady course, your compass will tell you when the log bears south. To make easy the operation of reading the compass direction of the log, the log line may be attached to the end of a pointer that moves under the compass, or under a "dumb compass" that is kept in agreement with the compass.

A little more also can be done; that is, this plan, slightly amplified, can be made to show the length of a flight as well as its direction. To do this, it would be necessary merely to tow what used to be called a "Massey's log." This was a simple contrivance towed by a ship, consisting of a sort of box which was fitted with a propeller that turned around when it was pulled through the water, and thereby actuated dials on the surface of the box. The dials indicated the distance that the box had been towed.

Imagine now that you are in an aeroplane towing a small, torpedo-shaped Massey's log, in which the revolutions of the propeller actuated dials on the body of the log. The direction of this log from you would be the reverse of your direction of flight; and the indications on the dials at any instant would show the actual distance that you had pulled the log through the water. At intervals of, say, an hour, you could haul the log up to the aeroplane and read what it said. In order to pull the log up to the aeroplane, and put it out again, a few minutes would be required, but certainly not more than five minutes. I think that, by noting this time, and applying it as a correction to the indications of the log, you could get the actual distance gone in an hour with only a small error. Suppose that you made an error as great as 2 per cent. In flying a distance of 1,000 miles you would make an error of 20 miles. If you were going 80 miles an hour, this would mean an error of 15 minutes of time in arriving at your destination.

This idea is a good one, and if someone will work it out to a practical success it will make ocean flight a simpler matter in some ways than the navigation of a ship. This is because: first, the time of flight will be so much shorter than that now used up by ships, that much less error will be introduced than ships are subjected to by reason of ocean currents; second, because an aeroplane can go direct from one place to another, and not have to change its course.


DIRECTION IN WHICH AEROPLANE IS POINTED.
DIRECTION IN WHICH AEROPLANE IS MOVING OVER THE WATER.
WIND ON LEFT SIDE
DIRECTION IN WHICH AEROPLANE IS MOVING OVER THE WATER.
DIRECTION IN WHICH AEROPLAN IS POINTED.
WIND ON RIGHT SIDE

CALM OR WIND DIRECTLY AHEAD OR ASTERN.

USE OF SOAP FILMS IN SOLVING IMPORTANT TORSIONAL PROBLEMS

By C. A. BRIGGS*

Associate Physicist, Bureau of Standards, Before the Journal Review Meeting of the Bureau of Standards

A GREAT many complicated physical phenomena can be expressed in simple mathematical formulas but what is more often the case many essentially simple physical phenomena can only be expressed with difficulty, or in such form as to limit seriously or nullify the practical applications to problems which it is important to solve. In many cases problems of a certain type can be solved and solved easily when they take restricted forms but when our needs make it necessary to consider other cases we are at once confronted with difficulties that too often render us impotent.

One old problem of this character relates to the stresses and twist produced in a prism of irregular cross-section by couples applied to the ends. When we have to deal with a circular cross-section or a hollow circular cross-section it is a simple matter to determine both the twist that will take place with any particular couple, and the magnitude and disposition of the stresses. When we depart from such a simple shape, however, we at once become involved in difficulties of very formidable character.

The solution of what we call the torsion problem has been a matter of practical importance in engineering problems for many years, and various expedients have been adopted to give us imperfectly what we were unable to obtain from our mathematics. Recently the design of aeroplanes has become of considerable importance, and in which are employed struts, propeller blades, supports, stays, etc., which are subjected to torsion, and in which it is necessary to employ sections of irregular form. The fact that it is of utmost importance to secure the greatest lightness consistent with strength therefore gives the solution of the torsion problem a most peculiar interest. It is, therefore, a rather happy circumstance that just at this time a practical means for solving the torsion problem is presented, which will enable us to obtain all the information necessary and desired in the design of torsion members having cross-sections of whatever character.

The method employed for getting this information has been developed by Messrs. A. A. Griffith and G. I. Taylor, and described by them before the Institution of Mechanical Engineers, and published in *Engineering* for December 21 and 28, 1917.

The principle upon which the method is based is one that was established several years ago, to the effect that the differential equation for the function from which can be derived the solution of the torsion problem, is the same as the differential equation of the curved surface assumed by a uniformly loaded elastic membrane stretched across an opening of the same shape as the cross-section of the torsion member. This relationship holds when the displacement of the membrane is small.

The authors obtained their solution for the torsion problem from measurements made on soap films in a box suitably arranged and convenient for the purpose. A horizontal plate is provided, in which are cut openings corresponding to the cross-sections it is desired to investigate. A soap film is then stretched across the openings and caused to bulge up slightly by producing a difference in air pressure between the two sides of the film. A glass cover for the box containing the film serves to enclose it and prevent evaporation of the film, thereby prolonging its life.

If the surface tension of the soap film were known and the difference in the air pressure between the sides of the film were measured, the facts necessary for the solution of the problem could be obtained from appropriate measurements made on the figure of the film. However, the determination of both the surface tension and difference of pressure are not easily accomplished in practice, and the need is avoided by comparative measurements. In addition to the form of the cross-section to be studied, there is provided in the plate a circular opening which represents the case for which the mathematical solution of the torsion problem is known. The pressure and surface tension is the same for both openings, and the properties of the irregular cross-section are determined by comparing measurements made on its soap film with those obtained from the circular opening.

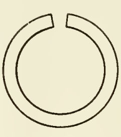


FIGURE 1

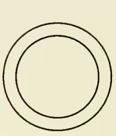


FIGURE 2

The slope of the film at any point is proportional to the shearing stresses set up. An auto-colimating device of simple construction, using light reflected from the film, is used for this measurement.

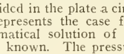


FIGURE 3

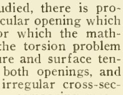


FIGURE 4

The relative stiffness of the member is proportional to the volume contained between the film and horizontal plate. This can be obtained in two ways: first, by budging the films, by displacing the air in the lower compartment of the chamber by introducing a given volume of soap solution; secondly, from the contour lines of the film from which the volume can be obtained by computation. This latter method, while much more complicated, has some advantages.

The contour lines of the soap film are located by means of a point wet with soap solution, carried downwards from a micrometer spindle passing through the sheet of glass covering the top of the box. The position at which the point makes contact with the film can be determined by inspection, and this can be done with very great accuracy.

In addition to giving the volume, the contour lines serve two other purposes: first, each contour line represents a form of cross-section for which the film above it gives the solution for stress, etc. This can be understood from the fact that each contour is the equivalent of an aperture of that form in the plate. At one time, therefore, the solution for several forms of cross-section can be obtained and cataloged; secondly, the contour lines indicate the direction of the shearing stresses. At the surface of the prism there are no shearing forces across the boundary, or surface traction, and this is true for each contour line. Therefore, a torsion member could be segmented along the contour lines without affecting the strength or stiffness of the member, if each part were devised to carry its proper share of the torsion couple.

It is a credit to the authors that they developed their apparatus to the extent that they could carry out in a practical manner the various measurements called for and increase the attractiveness of the method.

From a practical standpoint, the method has many important advantages over a mathematical solution of the problem, if such solution were possible. The method appears to be a very flexible one and for routine work can be adapted to give very prompt results. A feature of very great value is that considerable information can be obtained by merely inspecting the form of the soap film. It is easy to see the effect of inwardly directed angles or curves in increasing the stresses of the cross-section, and improvements in design at once suggest themselves. What is of interest also is that when one becomes accustomed to the forms assumed by films a good mental picture can be formed of what will take place without the aid of the apparatus.

This article has been very well received and has excited an unusual amount of interest and favorable comment. In addition to its practical value, it appeals particularly to the imagination and there are, no doubt, many who are taking an interest in the subject not so much for what is done as for the manner of its doing.

Comments

Solution Applies to Isotropic Materials: What does not appear to be mentioned is that the direct application of the method as given relates only to isotropic substances, while in the construction of aeroplanes wood is used, which is far from being such a material. It may be found desirable, therefore, to modify the method. However, the authors of the papers tried out the method by experiments on a wooden member and found that the twist obtained by a given couple checked very well with that determined by the soap film.

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*Review of a paper by Messrs. A. A. Griffith and G. I. Taylor, in "Engineering," December 21 and 28, 1917.

Ambiguity in Certain Cases: There are certain cases of interest in which a wrong conclusion may be formed, and in which the method may be condemned for what would appear to be an obvious failure of the method. For instance, all of you have twisted in your hands those split brass curtain rods, which can be obtained at any 5 and 10c store. You will also recall that these rods were very easily twisted. The aperture representing this curtain rod is given by figure 1.

You will have no difficulty in imagining a soap film stretched across such an opening. Now let us take the curtain rod and secure its edges together so that they can no longer slide past each other when the rod is twisted, such as by soldering them together at several points. It will then be found that the stiffness of the rod is very greatly increased. Let us now cut out the gap from between the two ends of the soap film aperture so that it will represent the case of the stiffer tube or curtain rod as illustrated in figure 2.

On now examining the film stretched across the opening, we fail absolutely to get any indication of the great increase in stiffness which we found to be the case with our curtain rod. As stated above, the stiffness of the members subjected to torsion is proportional to the volume inclosed by the film. In joining the two ends of the aperture together, we get no very material increase in the volume of the film.

Furthermore, if we now decrease the diameter of the inner boundary until it is small compared with the outer boundary, we obtain a film somewhat as indicated by figure 3.

This figure indicates that the center hole has a very profound effect on the stresses of the cross-section and that the greatest stresses occur at the center, both of which indications we know to be contrary to fact. What then is the difficulty? This is easily explained.

As soon as we cut the gap from between the ends in the outline representing the split ring we have no longer the appropriate film for our purpose. Before we cut the gap we had one continuous boundary, and the torsion problem could be represented by a surface of one sheet. Just as soon as we have joined the two ends together, however, we have two boundaries and the torsion problem must be represented by a surface of two sheets. The case is therefore given by a film arranged as indicated in figure 4.

We have two films, one upwards and one downwards, representing the two sheets required for the solution of the problem. The torsion function is given in this case by the algebraic sum of the ordinates of the two films. We will at once see that the last arrangement of films gives correctly what we know to be the solution for this particular and simple case.

This ambiguity is mentioned for the fact that in going over the scheme mentally, so to speak, I was somewhat upset, after being attracted to the method, to find an apparent failure of it to hold good.

Modifications of the Apparatus

Location of Lines of Constant Shear: The contour lines give the direction of the surfaces across which there exists no shearing stress. However, a shearing stress exists along other directions for each point in every contour, and the value of the shearing stress will in general vary from point to point along the contour lines. What will be of interest, therefore, will be to locate the lines of equal shearing stress in the cross-section.

I have to suggest a simple arrangement, by means of which this can be accomplished. Let us secure a table or stand of suitable construction, mounted to rotate about a vertical axis, and mount upon it a camera directed downwards towards a support for the box containing the soap film. Also let the axis of the lens coincide with the axis of rotation of the table, and let the film be centered substantially with reference to the axis of rotation; and let a light be placed above the soap film at a fairly great distance from it and so mounted that the light can be adjusted to strike the film at any desired angle with the vertical.

From the position of the camera the light will be seen reflected in the film as a pin-point of light. The point from which the light is reflected is determined by the slope of the film at that point. If now the table carrying the camera and soap film be rotated about the vertical axis, the point of light will appear to move around the film, and the plate of the camera will record a horizontal projection of all points of the film having the particular slope for which the light is adjusted. In this manner, by suitably changing the position of the light, all points having the same shearing stresses will be photographed in one figure as a series of lines which can be studied at convenience.

Photographing the Contours: If we take a plate of glass, wet on the lower side with the soap solution, and, holding it in a horizontal position, bring it downwards into contact with the film, the film will make contact with the glass along a contour line. However, the volume conditions have been disturbed, so that the contour corresponds to the undisturbed film at a different height. If now air is withdrawn until the volume of the remaining part of the film is the same as it was before the plate was used, the contour formed by the film meeting the glass is the same as that present at that position before the glass was brought into contact; and the desired contour can be photographed if the appropriate illumination is furnished. By placing the cover plate at a different height and making the necessary changes in volume, any series of contour lines can be mapped out and recorded, either by photographing or by drawing on the plate over the outline of the film.

For the required volume adjustments several different schemes suggest themselves. One method would be always to adjust the bubble formed over the circular opening to a fixed height by the use of suitable points or other indicators. However, in this case it would be necessary to arrange so that the glass plate would not make contact with the reference bubble or interefere with the height indicating devices. Another method would be to have the size of the circular opening such that its reference bubble also would make contact with the plate whenever the other film touched it. The volume of the film could then be adjusted by furnishing several templates corresponding to the contour of the circular bubble, for the various heights at which the plate is to be used and then adjusting the pressure until the area of the contour of the circular bubble was of the correct size as shown by the template for that particular position of the plate.

INDORSE CAPT. LA GUARDIA

Republican Colleagues in Congress Urge Re-election of Aviator

Washington, July 13.—At a meeting today of the New York State Republican delegation in Congress, called by Representative Fairchild, Chairman of the delegation, this resolution was adopted unanimously:

"Whereas, Fiorello H. La Guardia, a Representative in Congress from the Fourteenth District of the State of New York, has been serving his country for several months as an officer in the Aviation Corps in Italy;

"Whereas, by his patriotism in giving his services to his country, and by his splendid work he has been able to do, by reason of the fact that he speaks fluently the Italian language, and also by reason of his position as a Representative in Congress of the United States, in cementing more closely the friendly relations between Italy and this country, and by reason, furthermore, of the valiant service he has rendered since he volunteered, be it unanimously

"Resolved, by his colleagues from the State of New York, that his course entitles him to enthusiastic approval of all Americans, and, in our judgment, entitles him to the loyal support of the constituents he is now representing in his campaign for a return to Congress at the election this Fall."

Flying Field at Anacostia is Named "Bolling Field"

The following order has been issued by Maj. Gen. William L. Kenly, Director of Military Aeronautics:

"The flying field at Anacostia, D. C., is named 'Bolling Field,' in memory of the late Col. Raynal C. Bolling, Signal Corps, who was killed in action on or about March 29, 1918, on the road between Estree and Foukan Court, France, during the German offensive."

The new field, which is now practically completed, will be a single squadron field with a capacity for 18 planes. It will serve three purposes, first as a field for experiments which it is desired be made near Washington; second as the terminal of the New York-Philadelphia-Washington Aerial Mail Service, and third as a training field where administrative officers in Washington may learn to fly, without interfering with their other duties.

Col. Bolling, for whom the field was named, was sent overseas on July 16, 1917, as head of America's first Aviation Mission to the Allied Governments.

Col. Bolling was born in Hot Springs, Ark., September 1, 1877, graduated from Harvard College in 1900, and rose rapidly through the legal profession to the position of general solicitor of the United States Steel Corporation. In August, 1915, he organized and took to the training camp at Plattsburg an experimental motor machine gun battery of 70 officers and men, and in the spring of 1915, as a first lieutenant in the Signal Corps of the National Guard of New York, organized the first aero company of the guard in the United States. He passed his reserve military aviators test in the following September, and on March 14, when war with Germany appeared inevitable, was recommended for a commission as major in the Signal Corps. He was assigned to active duty on May 10, and on June 9 ordered overseas as special representative of the Aircraft Production Board.

U. S. Airmen Honored

Italian Army Headquarters.—Five American aviators attached to the Italian army were decorated with the Italian War Cross on July 4th by King Victor Emmanuel at a review in the presence of Gen. Eben Swift, head of the American military mission.

They were Lieuts. Archibald Frost, John Park, Raymond Baldwin, Kenneth Collins and John Galchoux. The crosses were given for carrying out the greatest number of bombing raids during the recent Austrian offensive.

THE LATERAL DIHEDRAL

By JOHN G. HANNA

THE recent discussion of this subject in these columns by Mr. William R. D. Shaw, the English aviator, proved of much interest to the present writer, who has, during eight years of designing, been a consistent advocate of the use of the dihedral. In the early days no subject was more argued over and thrashed out. More recently other questions of design have come into prominence and the dihedral has been overshadowed. But perhaps a simple presentation of the elementary principles of the subject will be of interest at this time to the thousands of newcomers in the industry whose acquaintance with it does not antedate the war.

Mr. Shaw's article will furnish about as good a text as any other for this discussion, and it should be understood that references to his remarks are by way of illustration only, and are not made in any spirit of controversial criticism.

It is rather drastic to say, as he does, that nine English text-books out of ten give an erroneous explanation of this principle. But to say that "the stabilizing principle is derived from the change in the projected plan area of the wings of an aeroplane as the latter rotates about its horizontal longitudinal axis" is to put the matter, if not incorrectly, at least obscurely and inadequately. A much clearer analysis of the forces is possible.

Let Fig. 1 represent an aeroplane in horizontal flight. For simplicity in the drawing a monoplane with the wings meeting at the center of gravity is indicated. Let the arrows A and A^1 represent the lift on each wing, acting at its center of pressure. These forces will have components N and N^1 normal to the wing and tending to rotate the machine about its center of gravity. Being equal while the machine is level, they neutralize each other, and no rotation occurs. Now suppose the machine to tilt as indicated in Fig. 2, all other conditions remaining constant. It is seen that the normal component N is greatly increased, while the normal component N^1 is decreased. Thus their algebraic sum results in a turning moment about the center of gravity which rights the machine. But it may be shown by the principles of similar triangles that the ratio of N to N^1 is equal to the ratio of R to L, these latter representing the projected plan area of the wings. Hence it may be said that the text-books Mr. Shaw condemned were right, to a certain extent. There is another way of looking at the matter, namely, to consider only the forces A and A^1 and note that when the machine is tilted A acts through a virtual lever arm X which is longer than the virtual lever arm Y of A^1, and thus a righting force results. The ratio of X to Y is also equal to the ratio of R to L.

That is about all that can be said for the projected-area theory, and even when explained to the fullest extent possible it still leaves some unsatisfactory points. There is a better and more logical method of considering the forces acting on a dihedral plane, and this method will now be discussed.

Taking Fig. 3 to represent the same aeroplane as Fig. 1 and under the same conditions, the normal pressures on the wings, considered as concentrated at the center of pressure on the wing, would if prolonged meet in a point P above the wings. (In reality, the pressure forces below the wing and the depression forces above will have separate meeting points, and any slight inequality in pressure or pressure distribution will affect the location of the points; so that the quantitative determination of P is as difficult a problem as ever delighted a mathematical shark. These considerations, however, do not invalidate the qualitative exposition of the theory.) The effect of the forces N and N^1 is here equivalent to that of the single upward force L, acting directly above the downward force W, the weight of the machine, and resulting in perfect balance.

Now when the machine tilts, as shown in Fig. 4, the point P is displaced to one side, and as a result several different actions take place. The vertical component of L is no longer equal to W. As the resultant of L and W, the machine moves outward and downward in the direction of the arrow S. This results in a wind force on the lower wing K. V and K tend to move the point P back to its original position, while at the same time W is moving toward the present vertical plane containing P. Equilibrium is restored when L and W are once more in the same vertical line.

In practice, when L and W move to re-establish their coincidence, they both overshoot the mark, and the reverse movement takes place, resulting in the well-known "rolling" action. The amount of side-slip that takes place before L and W are again in line is proportional to the dihedral angle. That is to say, a plane with a dihedral of 175 degrees would have to slip much farther than one of 160 degrees; for in the latter case the height of P, and consequently the separation of L and W laterally, would be much less.

This method of considering the forces may be applied to any dihedral, whether positive, negative, or zero, and its explanation of stability holds good in any case. Fig. 5 shows an aeroplane with a negative dihedral. In this case the normal forces on the wings meet in a point *below* the machine. Their equivalent is an upward force L equal to and balancing W. It will be seen that the machine is practically a pyramid balanced on its apex, so far as stability goes. When the machine tilts as illustrated at Fig. 6, unbalanced forces instantly act to tilt it still farther, and in this the wind pressure K helps.

The only possible method of keeping upright a machine with a negative dihedral is to use a very low center of gravity. It is significant that the few natural examples of a negative dihedral in flight are all so arranged. Fig. 7 shows the typical wing and body position of the pelican. But this bird is by no means a stable glider in anything but uniform air conditions, and in gusts has to resort frequently to wing-flapping to restore equilibrium. Fig. 8 shows the typical wing and body outline of the common buzzard, one of the most perfect soaring flyers. In a gale these birds certainly do roll, but they remain calmly stiff-winged and never lose their balance.

It has been proposed to use a wing in the form of a segment of a circle, as illustrated at Fig. 9. This would have many of the good points of the dihedral. An excessive side-slip with such a wing would be almost impossible. But it involves some sacrifices of lift, and structurally it would be almost impossible on small machines. The big Handley-Page shows somewhat this appearance in its photographs, and is known to be a very stable machine. Another solution of the side-slip is shown at Fig. 10. This is structurally entirely practicable, and the upturned wing-tips effectively check side-slips. It lacks the dynamic stability of the dihedral and of the circular shape, and has no rolling action. The objection to it is that the upturned tips are largely parasite resistance, as they contribute little to the lift.

It is interesting to apply the foregoing method of force analysis to the plane with zero dihedral, though the condition cannot be represented in a drawing. In this case the forces N act vertically, are parallel, and consequently their meeting point P is at infinity. A small tilt will displace P an infinite distance to one side, and no amount of side-slip can bring L and W into line again. Consequently L must be brought back above W by turning the wings back to level through the aileron control. Hence the straight wing has no dynamic stability—its rotation brings no corrective forces into play.

In viewing the drawing of Fig. 3 the thoughtless observer is likely to conclude at once that it represents in effect a pendulum. And even aviators of long experience and men who have designed successful machines persist in speaking of pendulum action and in thinking the dihedral-winged machine acts on the pendulum principle. Such is not the case, however, any more than the rolling of a ship is pendulum action. The Point P has some analogy with the metacentric point in the stability diagram of a ship, though the correspondence is not exact. It is a pity that all aeronautical engineers cannot be compelled to study first the principles of ship stability as expressed in marine engineering. For while, of course, there is no direct equivalent whatever between ships floating in water and aeroplanes dynamically supported in air, and while few marine engineering principles are directly applicable to aeroplane design, yet this study would result in a far better understanding of what *safe* stability really means; it would save oceans of twaddle that are written and spoken about aeroplane stability; and it would avoid some designs whose building is a waste of money and whose failure often involves a waste of life.

So far, in considering the stability of the dihedral, no account has been taken of the position of the center of gravity of the machine with relation to the wings. This position has an important modifying effect, or rather several effects. Let us see what they are.

Fig. 11 illustrates the three possible positions; with the center of gravity at the apex of the dihedral, with the c.g. below this apex, and with the c.g. above this apex. It is readily seen that in the second case the righting force acts through the longest virtual lever arm L', and in third case through the shortest lever arm L''. Consequently the righting force is increased by a low c.g. and diminished by a high c.g. Those who proclaim the latter fact as a virtue should remember that the righting force can also be diminished to any extent desired, and more easily and safely, by the simple expedient of flattening the dihedral.

These various positions of the center of gravity have their characteristic effects in banking. The c.g. must be considered in this connection relatively to the center of lateral resistance. A very simple illustration of the forces involved is given in Fig. 12. If a ball suspended on a cord is set moving in a circular path, it will swing outward to such an extent that the resultant of the tension in the cord and the pull of gravity just balance centrifugal force. For any given mass, velocity, and radius of the circular path, there is a definite angle of the cord which will exactly balance all forces, just as for any aeroplane at a given velocity and radius of turn there is a natural banking angle which will result in perfect balance. If a centripetal force is applied to the cord sustaining the ball, the axis of the latter will assume a greater inward inclination; while if such force is applied below the ball, as for instance, against a pin projecting from its axis, this axis will assume a lesser inward inclination, or none, or even an outward inclination.

Such effects are precisely those that take place with a turning aeroplane. The machine with a low center of gravity tends to turn inward too far, and risks an inward side-slip It has been shown, however, that this type is also the one with the strongest corrective power over side-slipping and the one least in danger from it. The machine with a high center of gravity tends to bank too little, and risks an outward skid or slippage which may develop into an outward and downward slip. In the latter case its position is critical, for this type has the least natural power of correcting its side-slips.

In a case where the center of gravity is actually so high as to come above the center of lateral resistance, the machine of itself cannot bank inward at all, but will tend to turn over outwardly unless forced to bank by use of the ailerons. For it is then in the position of the third illustration of the swinging ball just given. Inasmuch as the center of lateral pressure on the wing is not far from the center of supporting pressure, and when other lateral surfaces are considered, the net center of the entire lateral forces may be at or below the center of support, it seems a very radical statement to say "if the principle of the lateral dihedral is correctly applied the center of gravity should be above the center of support"—a very radical statement indeed, to put it mildly. It will be difficult and perhaps impossible to prove that statement, either in theory or in practice. So far it has never been proved, and certainly not by the Fokker monoplane.

This machine was cited by Mr. Shaw as proof of the statement above quoted. While a scale drawing of it is not at hand, it is the writer's recollection that its proportions were substantially as indicated at Fig. 13, and that its center of gravity was very slightly below, or perhaps coincident with, *but not above,* its center of support. It is true that it showed excellent lateral stability, but that is about all that can be said for it. Structurally it was a crime: the old three-wheel Curtiss was no worse. Today we recognize that landing stability is really more important than stability in the air. Who among our most audacious pilots would care to bring this Fokker to ground at 50 miles an hour on the rough surface of a hastily improvised aerodrome at the front, or who would risk a *vrille* with its poorly braced wings?

In behalf of the brotherhood of designers, a plea might be addressed to the brotherhood of flyers, who often wonder why the men at the drafting board do not incorporate such and such improvements. The answer is that, while we know very many ways in which an aeroplane

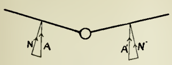


Fig.1

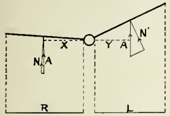


Fig.2

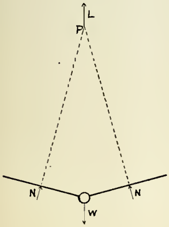


Fig.3

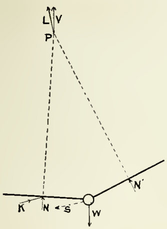


Fig.4

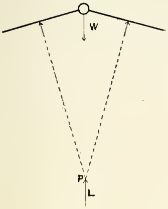


Fig.5

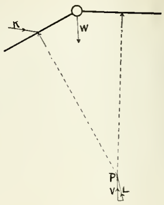


Fig.6

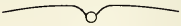


Fig.7

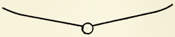


Fig.8

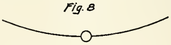


Fig.9

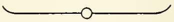


Fig.10

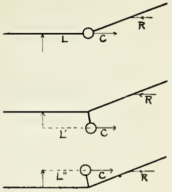


Fig.11

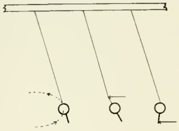


Fig.12

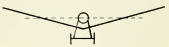


Fig 13

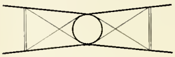


Fig.14

might be improved aerodynamically, the limitations of the principles of mechanics and the properties of materials so far prevent us from using this knowledge. We know, for instance, that the elimination of wire bracing from the wings will greatly improve speed. But if this elimination means such an abortion as the present wireless Fokker triplane—well, let Herr Fokker do it.

For the machine with a high center of gravity it is argued that in case of engine stoppage the aeroplane assumes a natural gliding angle. Sometimes it does; and sometimes it assumes a natural vertical nose diving angle, from which only a very expert pilot can extricate it, perhaps by a loop. Such a statement as the following cannot be passed by: "Of course, longitudinally it may be advisable to employ a rather larger tail with the high center of gravity; this is a moot point." In the humble opinion of the writer, this is not a moot point. It partakes of all the elements of absolute certainty. Besides a larger tail, he would suggest for such a machine a larger rudder; larger ailerons; larger shock absorbers; a larger safety belt; a large parachute for use in case the pilot had to abandon a machine hopelessly beyond control; and a large life insurance policy in case the parachute failed to work.

It seems rather futile to argue that a high center of gravity lessens or neutralizes the righting power of the dihedral. True, but why go to much pains to make a structure that will have certain properties and then go to still further pains to add a modification that will destroy all these laboriously acquired properties? Most certainly, by locating the center of gravity in line with the center of lateral pressure, the banking of the machine on a turn can be made a matter of delicately exact balance—under normal conditions. But abnormal conditions, ever present in the air, can destroy an exact balance at any moment. It is the consensus of opinion among designers today that it is best not to strive for an exact balance of this nature; it is best to approach the theoretical ideal, but to keep far enough away from it to assure a good margin of safety under practical conditions.

The search—now perhaps twenty years old—for a dihedral construction that will have a strong righting force, but at the same time will not rock or roll, belongs in a class with the search for the philosopher's stone and for perpetual motion. It is one of the classic delusions of the ages. For it is a universal law with countless manifestations that whenever a natural force acts to restore disturbed equilibrium, a diminishing and vanishing oscillation is the accompaniment. So great is the law that it transcends the realm of physics and has its instances in psychology. It is not clear why this diminishing oscillation, which is small in a well designed machine, should be considered an evil. It cannot become an increasing oscillation unless a nervous pilot misuses his lateral control in trying to check it. The damping effect of the wings is a powerful check on oscillation, and incidentally is greatest with a low center of gravity and least with a high center of gravity.

A certain poorly informed seeker after the non-rolling dihedral once advanced the very slight rolling of the great Atlantic passenger liners as proof that non-rolling forms can be developed. But the truth is that these ships have not the most safely stable forms that naval architects can design—far, very far, from it. Their motion is slight because their huge mass, in combination with their speed, develops an enormous number of foot-pounds of energy against which the impact of disturbing waves is comparatively feeble and ineffective; precisely as the 200 H. P. Spad fighter can ride a gale easily, thought it has little stability of form, because its great speed, in combination with its mass, develops an enormous number of foot-pounds of energy against which the impact of disturbing gusts is comparatively feeble and ineffective. In the writer's opinion, it is in this direction that the ultimate settlement of the problem of lateral stability lies; namely, a moderately stable form, in combination with sufficient mass and speed to smash through all opposition with little difficulty, and, for the exceptional conditions, good lateral controls and a good pilot to handle them. No one can say what will be done in the years of infinite possibilities before us; but some basic principles are by now established with sufficient firmness to make it safe to say what will *not* be done. And it is reasonably certain that the safe machine of the future will not be any such freak design as the early Fokker monoplane, or for another instance the Dunne—both perfect as to their theory but structurally not to be tolerated, and with aerodynamic defects that outweigh their aerodynamic advantages.

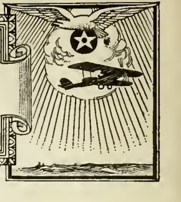
As regards the application of the dihedral to the special case of the tractor biplane, many will agree with Mr. Shaw that the machine with dihedral on the lower plane only is a very desirable type. It has performed well, and has, as he says, many points to recommend it. One objection is the reduction of the gap, and consequently efficiency, towards the wing tips. But it may safely be said that the tractor biplane with equal dihedral on both wings will always be seen, and perhaps will be the favorite type, as long as men navigate the air.

What is said by Mr. Shaw as to the bad effect of an inclined virtual axis of inertia on the stability of the positive dihedral is very true. Conversely, such an inclined axis may give the negative dihedral some approach to stability, though it is hardly correct to honor that wretched conception, the negative dihedral, with any even greatly qualified use of the word "stable." It seems to be the consensus of opinion among designers that the inclined virtual axis of inertia is bad in any case and with any modifications, and any considerable inclination must be avoided.

After the many references that have been made herein to Mr. Shaw's article, a comment on his closing sentence, though it does not concern this special subject, is only just. "As an aviator, of course, the writer is not too well acquainted with the methods of designers of high class aeroplanes, but he hopes they will find the points raised worthy of their consideration." He may feel assured that designers of good machines do find the views of practical, thoughtful flyers not only worthy of consideration, but always welcome and often valuable. The other kind of designer, self-sufficient in his own narrow little field of book theory, will pass away. Better co-operation will save the building of such types as that indicated at Fig. 14, whose dazzling wing arrangement proceeded from the brain of a designer who, on the one hand, had not flown 18,000 miles, and on the other, had not devoted ten years to the study of the properties and possibilities of the dihedral—perhaps not even ten minutes.

It would be well if we could have more frequent expression of the views of the aviators on points of design. For it's a big job before us, this conquest of the air—the biggest man ever tackled. It isn't a one-man or a one-class job. In the struggle toward ultimate perfection there is work for the designer, the aviator, the builder—for every last and least man connected with the industry—work enough and glory enough for all.

NAVAL and MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eherts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Dallas, Tex.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLR—Commissioned as Second Lieutenant. Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Note 1—Report to points named in order mentioned for temporary duty.

Note 2—Report to Aviation General Supply depot, Middletown, Pa.

Note 3—Report to Radio School, Austin, Texas.

Note 4—Report to Capt. M. H. Grace, Grand Central Palace, 46th St. and Lexington Ave., New York

Note 5—Report to District Manager of Prodution, 480 Lexington Ave., New York.

Note 6—Report to Union Switch and Signal Co., Swissville, Pa.

Note 7—Report to Expeditionary Depot, Baltimore, Md.

Note 8—Report to S. C. Recruit Depot, Fort Wayne, Mich.

Note 9—Report to Army Balloon School, Leehall, Va.

Note 10—Report to Bustleton, Philadelphia, Pa., Officer i/c Aerial Mail Service, operations section.

Note 11—Report to Approvals Officer, National Cash Register Co., Dayton, Ohio.

Note 12—Report to Commanding General Southeastern Dept., Charleston, S. C.

Note 13—Report to Army Balloon School, Arcadia, Cal.

Note 14—Report to S. C. Aviation Mechanics School, St. Paul, Minn.

Note 15—Report to Aviation general Supply Depot, Chicago, Ill.

Note 16—Report to Silvex Co., South Bethlehem, Pa.

Note 17—Report to Commanding General, Governor's Island, New York.

Special Orders No. 147-152, Inclusive

A

Ainsworth, Cyril	TFT
Armanstrout, Guy E	FOB
Ames, Adelbert	DAP
Allen, George B	FRF; TFT
Apgar, Frank F	LDT
Adams, William A., Jr	MAT
Altman, Harry L	AFO
Ashe, Harry P	MAT
Arnold, Ivan T	PMT
Alling, Kenneth S	FRF
Armstrong, Walter	AFO
Ayars, Milbert P	DIK
Aven, William R., Jr	FRF
Armstrong, Max V	DIK
Arnold, George M	FRF
Adams, Henry P	DMA
Austin, Eugene H	WFO
Ayer, Carleton S	EOT
Anderson, Anthony A	WFO
Armstrong, Ralph S	TFT
Arnold, Wellington	Note 3

B

Bartholomae, William A., Jr	FRF
Baetjer, Charles H	DMA
Beattie, Theodore L	TFT
Bird, Emerson P	FRF
Bazley, Halsey R	DIK
Blunk, Adolph	FRF
Baird, Andrew	FRF
Bostwick, William H	LHV
Barksdale, James B	PWM
Baker, Solomon F	FRF; TFT
Beeks, Herbert S	FRF; TFT
Benton, George A., Jr	FRF; TFT
Brackett, Edward T	FRF; TFT
Butler, Clyde H	FRF; TFT
Boulton, Howard	DMA
Butts, John W	DMA
Benner, Wesley	CGC
Berg, Carl L	FRF
Bailey, John Madison	SLR; FOB
Bridge, Robert B	CGC
Budd, Denison M	FRF
Baldwin, Marion A	FOB
Bond, Wilmer K	DIK
Bush, Bradford S	KST
Brennan, John Patrick	SLR; KST
Barler, Richard C	FRF
Beam, Rosenham	FRF
Beiseker, Charles E	DIK
Besse, Gerard C	FOB
Burns, John Vernon	SLR; HHN
Baron, Leo A	FRF
Babcock, Henry Stoddard	SLR; CAF
Borden, John A	AFO
Barnett, Robert Marrs	DIK
Bagley, Henry S	AFO
Bach, Albert	FRF
Bash, Henry E	FRF
Blanche, Eugene H	FRF
Booze, Ralph W	FRF
Brown, Wayland H	FRF
Butner, John Calvin, Jr	DIK
Beck, William M	MAT
Brennan, James D	AFO
Bevan, William A	MAT
Bower, Raymond G	SBI

Brew, Paul	FRF
Boyd, George W	BST
Baskett, Edgar S	EOT
Bunn, Charles	FRF
Bacon, Benjamin S	SMM
Brush, Oliver G	SMM
Breeze, Clinton S	SMM
Brown, Wallace A	DIK
Boothe, William H	PFO
Bergman, Arthur J	FRF
Bryan, Louis C	FRF
Bean, Herhert S	FRF
Behel, Vermon W	EOT
Blackburn, Border	FRF
Behr, Kenneth P	LHV
Bothwell, Roy Clayton	SLR; PFO
Bastow, Joseph G	TFT
Backus, Clinton J	FRF
Burns, John V	DIK
Bond, Wilmer K	FRF
Bramhall, Maynard	TFT
Belsky, Charles J	FRF
Burrows, Frank H	PFO
Braun, Milton F	DIK
Blake, Frederick H	WFO
Brizzolara, Rohert Thomas	SLR; PMT
Boggs, Stanhope S	DIK
Baisley, Herhert K	TFT
Bakala, Chester Chandler	DIK
Bullitt, Joshua F	BST
Brooks, Frederick A	PMT
Breakstone, Isadore Lawrence	SLR; GLC
Bullard, Edward L	PFO
Borden, Joseph L	LHV
Benjamin, Hamilton F	Note 17
Beveridge, John, Jr	Note 14
Butler, William H., Jr	Note 2
Blanton, Walter K	Note 2

C

Cox, Sull R	VBW
Cook, Phillip P	DMA
Cowen, Edward G	FRF
Coleman, Rohert H	DIK
Cumhus, John W	DIK; FRF
Cottrell, Clifton C	TFT
Clark, Gordon W	DIK
Camphell, Theodorick P	FRF; DIK
Christian, Savias T	FRF
Clinton, Ambrose Victor	SLR; FOB
Collins, Raymond B	FRF
Churchill, Walter A	PFO
Clark, John E	DIK
Caldwell, Frederick W	TFT
Cooper, Walter W	FRF
Crawford, Alan	FRF
Cole, Melverne C	FRF
Cameron, Burr S	SBI
Campbell, Don M	SBI
Caldwell, Frederick W	FRF
Caswell, Clyde C	FRF
Cowgill, John R	CGC
Cary, John B	FRF
Chase, Leo	SLR; FRF; CRI
Chase, Cecil A	DIK
Clark, Walter D	KST
Cummings, Barnard	FRF
Curry, William	FRF
Cann, Frederick B	FRF
Claar, Stewart B	KST
Collins, Albert J	WFO
Conkling, Ronald	DIK
Compton, Earl V	DIK
Cross, Frederick R	FLR
Childress, Charles W	BST
Cunningham, Samuel D	BST
Conway, James V	PFO
Colton, Ralph M	EOT
Crothers, Donald H	DIK
Cotton, John B	PFO
Crippen, Earle Henry	SLR; EOT
Connolly, Barnard	FRF
Cutter, Charles E., Jr	TFT
Christie, Edward M	EOT
Coogan, Gardiner	PMT
Caley, John L	FRF
Crehore, John D	LHV
Cook, Joseph R	FRF
Cooper, Carl B	FRF
Cover, Carl A	DIK
Chalfant, Harvey O	FRF
Chatterson, Marshall C	DIK
Croxson, Alhert M	PFO
Cundiff, William I	SMM
Chase, Leo	DIK
Calhoun, John Vernon	SLR; LDT
Clampett, Frederick W	EOT
Chaffee, Floyd M	FRF
Carroll, Alonzo M	FRF
Currie, Kent D	DIK
Carter, Edward V	FRF
Conner, Richard M	BST
Conrad, Max H	TFT
Coffman, Lionel A	FRF
Culbertson, Joe L	Note 2
Culhertson, Craig	Note 13
Campbell, Allan	Note 8
Cram, Ralph H	Note 3
Cook, Howard E	Note 2
Carter, Keith	Note 2
Clark, Russell	Note 2
Couzens, John Clark	Note 6

D

Donlin, Anthony B	SAG
Duncan, Thomas	WFO; WDM
DeCourcy, William E	TFT
Doggett, William K	FRF
Daley, Eugene F	FOB
DeGroot, Horace E	DIK
Degener, Paul A	EOT
Drennan, Leonard H	JMA
Dussere, Louis	DIK
Dingeman, Henry I	TFT
Dehman, Wallace W	TFT
Dougherty, Elmer L	FRF
Dominick, Lamont	DMA
Dougherty, Francis M	BFT
Davis, Harold F	MAT
Decker, Kenneth N	DIK
Doerr, Harry David	SLR; GLC
Davis, Rowland L	FOB
Daley, Henry Francis	SLR; PFO
Dean, John R	GLC
DeLoney, Alhert F	CGC
Dana, Leslie V	KST
Davis, Paul A	DIK
DeCamp, Merritt J	DIK
Deacon, Ralph A	MAT
Dudley, John Kyle	SLR; LDT
Donovan, John C	DIK
Donovan, Lawrence J	DIK
Durar, George H	SMM
Dalton, William E	DIK
Denie, George R	TFT
Duke, John F. S	BST
Day, Stephen D	FRF
Dreher, Raymond C	BST
Ditty, Cecil A	Note 2
Dilworth, Dewees W	Note 2
Dodge, Gordon	Note 10
Dearden, James R	Note 9
Daddow, Samuel Harris	SLR; Note 6

E

Elridge, Loyal A	FRF
Easterling, Anthony M	SAG
Eliason, Carl G	DIK
Ellis, Edgar H	FRF; DIK
Easley, Sam A., Jr	TFT
Early, Lawrence	DIK
Evans, Edwin B	DIK
Eastman, Stanley E	FRF; SLR; AAD
Elliott, Kerley C	TFT
Eagley, Karl Case	SLR; PMT
Earle, Ralph	DMA
Eisenchimel, Milton C	DMA
Elkema, Emil C	DIK
Elliott, Arthur E	FRF
Eldridge, John R	SLR; AAD
Erickson, Fridjof C	BST
Ernst, Grant W	PFO
Engesser, Benjamin Martin	SRL; PFO

F

Fitzmaurice, William J	JMA
Field, Howard	FRF; DIK
Fields, Curtis P	SAG
Francis, Olin C	SBI
Fonseca, Francis M	TFT
Fenwick, Herbert F	DIK
Fenton, Paul E	DIK
Farwell, Alhert D	MAC
Farnum, William C	FRF
Fendrick, Raymond S	TFT
Fraser, Kenneth G	FRF
Fee, Ray E	SLR; AAD; FRF
Folsom, Harold J	FRF; KST
Frith, Edwin H	AFO
Folz, Charles J	FRF
Finlay, William Poun	SLR; EOT
Fisher, Randolph R	FRF
Fox, Edwin D	CAF
Ferree, David Scott	SLR; EOT
Foster, Ralph F	KST
Feldman, Hans A	FRF
Franck, George Theodore	SLR; KST
Fulwiler, Howard D	FRF
Farrell, Thomas J	CWT
Ferris, Thomas H	ELA
Fiske, Leland Emherson	SLR; GLC
Frank, Charles Henry Ernes	SLR; DMA
Furey, Emmett E	EOT
Fulwider, James H	DIK

Pilot of the British Royal Flying Corps examining an air bomb which he is to deliver to the Germans. (Official photo)

A hangar, with wind direction indicator, at one of the American aviation training camps in France

Furber, Fred N	FRF
Fish, Frederick L	TFT
Fuller, Robert N	PFO
Foreman, Carrol L	LHV
Farrar, Delwin B	FRF
Fischer, Karl W	DIK
Foster, Esty	TFT
Feldman, Hans A	DIK
Foster, William John, Jr	SLR; Note 6

G

Graetz, Walter C	GLC; SRC; Note 1
Gordon, James B	FRF
George, Harold L	TFT
George, Marshall W	FRF
Geisendorf, Louis C	TFT
Goodnow, Wallace F	RWT
Gay, Ralph Ebey	SLR; PMT
Garwood, Leroy E	FLT; VBW
Grove, Robert E	MAT
Goldsmith, Henry S	DIK
Godehn, Reuel A	SLR; AAD
Gross, Edward H	DIK
Gilbert, Arthur C	DIK
Gregory, Alexander S	FRF; KST
Gassaway, Crosby Mitchell	SLR; LDT
Garnier, Edward W	AFO
Gibson, Julius R	DIK
Garties, George	FOB
Giddings, Lee C	SBI
Ganey, Daniel F., Jr	KST
Graham, Garrett H	DIK
Gape, Leo B	CGC
Goetjen, Floyd L	DIK
Gregory, Clarence W	FRF
Grimm, John	EOT
Graham, Charles F., Jr	DIK
Gruny, George R	DIK
Gordon, Myron B	DMA
Gaskell, Ellsworth Francis	SLR; HHN
Gulies, Robert C	FLR
Gober, James L	TFT
Graves, Nelson M	AMV
Green, Dwight H	BST
Galinger, George W	TFT
Grimes, Carl A	DIK
Grady, Harold H	BST
Gore, William M	DIK
Goss, Lewis W	TFT

H

Hanlon, William Jones	SLR; FRF; AAD
Hawks, Horace G	FRF
Haddorff, Carl L	FRF
Hall, Edwin P	FRF
Harlan, Roger K	TFT
Heinitsh George M	DIK
Howard, Raymond E	FRF
Hayes, Martin A	FRF
Handwerk, Morris C	FRF
Heck, George L	TFT
Hartford, Claude E	TFT
Hastings, Edward Rogers, Jr	SLR; CRI; FRF
Hartman, Clarence Arthur	SLR; TFT
Hart, Jabez Waterman	SLR; TFT
Hall, George Linwood	SLR; TFT
Halle, Simon	KST
Hammond, Fred R	SAG
Hillhouse, John G	DIK
Hale, January R	FRF
Hunt, Ralph Van Nice	SLR; FRF; AAD
Hoag, Charles E	DIK
Haldeman, Ward F	DIK
Harvey, Frank A	DIK
Hibben, Robert C	PFO
Huntley, James W	PFO
Holmes, Beverly W	FOB
Hollander, Robert B	DIK
Howard, Robert Burnham	SLR; PFO
Halsey, Frank D	FRF
Hunt, David M	FRF
Heffley, Armor Simpson	SLR; CRI; FRF
Hager, Henry M	FRF
Harvey, Hadley	FRF
Huffman, George R	FRF
Harp, Charles E	CGC
Horner, Thomas Elmer	DIK
Hiatt, John B	DIK
Huking, Harry W	KST
Hanson, Howell Redd	DIK
Hymer, Herbert A	AFO
Haff, Warren C	FRF; TFT
Holborn, Clarence Edgar	SLR; AAD
Hall, William T. I	DIK
Heaney, John W	DAP
Heng, Jacob Arthur	DIK
Harvey, John R	DIK
Houlton, Raymond C	BST
Haywood, Chester B	PFO
Hoyt, Howard C	PFO
Henderson, James M	DIK
Hesser, John W	DIK
Higbie, Carlton M	DAP
Huber, Howard F	TFT
Heller, Wilson B	FRF
Herring, Lloyd H	FTF
Heffley, Armer S	DIK
Harris, Benjamin T	TFT
Hyde, Jules V	BST
Hillman, Charles A	LHV
Harpham, Edwin L	FRF
Hendricks, George F	GLC
Holmberg, John B	FRF
Henderson, Elmer J	DIK
Houston, Horace K	PFO
Hoffman, Jay F	LHV
Hegan, Chester P	TFT
Harriman, Walter F	GLC
Heine, Bernhardt E	PFO
Host, Thomas P	TFT
Howe, Jesse B	Note 3
Hussey, Clyde L	SLR; Note 4

I

Iglehart, Francis N	FRF
Ivins, Maurice H	TFT
Isbell, Charles Woodruff	SLR; Note 6

J

Johnson, Carl E	DIK
Johnson, Perry V	DIK
Jackson, Clyde H	TFT
Johnson, Courtlandt Spencer	SLR; PMT
Jenkins, Nelson D	FRF
Jacobson, Chester J	MAT
Jacobs, John F	FRF
Jones, William M	FRF
Johnson, James Victor	SLR; GLC
Johnson, Herbert L	FRF
Jones, Clifford E	FRF
Joy, Henry M	DMA
Jennison, John C	BST
Jackson, Oliver P	LHV
Jones, John D	Note 9

K

Kerin, Anthony J	CWT; MAT; Note 1
Kraft, Lawrence Fenton	SLR; LDT
Kohr, Hugo J	FRF
Kresge, Clyde L	DIK
Kelly, James N	SBI
Kennedy, Frank M	PFO
Kraus, Edwin Joseph	SLR; CAF
Keiner, Harry	DIK
Kull, George C	PFO
Knight, Rixford	FRF
Kneeland, Lyle A	FRF
Kirkland, Samuel N	FRF; KST
Knapp, Ralph A	MAT
Kinnebrew, Edward Robert	SLR; CAF
Kincaid, Alvan C	FRF
Kimball, Milton S	FOB
Kauffman, Cyrus S	FOB
Kanitz, Edwin C	GLC
Kelly, John O	DIK
Kirkendall, Freeman B	TFT
Kirby, French	TFT
Kelly, Wallace William	SLR; EOT
Kresge, Ellwood F	TFT
Kearney, John J	FRF
Kiely, Daniel	PFO
Keyes, Nelson B	GLC

Photograph of the Aviation Section, Camp Sevier, South Carolina, showin

Klein, Pressley B.	FLR
Kampmann, John V.	Note 14

L

Lisenbee, George M.	AEO
Logel, Joseph F.	SAG
Lowry, Henry D.	TFT
Leek, John B.	SAG
Lungren, Edgar E.	FRF
Lyons, Philip T., Jr.	TFT
Lambert, John David Wooster	SLR; DMA
Lowe, Herman J.	SLR; AAD
Luddy, Joseph Ladimore	SLR; CAF
Lawrence, Clinton C.	FRF; DIK
Lynch, Harry H.	DIK
Liles, Fred C.	FRF; DIK
L'Ehmann, Chester L.	KST
Lyon, James Lowell	SLR; PMT
Lucas, Ottis Perry	DIK
Lobdell, Warren L.	KST
Loving, Paul	SLR; KST
Lyman, Richard S.	BST
Linder, John	GLC
Lobdell, Warren L.	FRF
Lawson, William E.	FRF
Lawrence, Harry F.	DIK
Lewis, David E.	FRF
Lundquist, Harry M.	TFT
Lowe, Larone	Note 15
Lewis, Charles W.	Note 2
Lewis, William	Note 14
Littlejohn, Charles F.	Note 2

Mc

McNeil, Guy L.	FRF
McClymond, Ernest L.	DIK
McChord, William C.	JMA
McCormack, Thomas H.	TFT
McAbee, Louis A.	DAF
McKay, Harold A.	DIK
McCollough, Henry F.	FRF; DIK
McAllen, William D.	DIK; FRF
McGhee, Leo Raymond	FRF; DIK
McGrath, Michael F.	FRF
McNabb, Harold R.	FRF; DIK
McCullough, John Milton	FRF
McDonald, Samuel F.	FRF
McCabe, Alfred S.	PFO
McClung, Hugh C.	CWT
McNaught, Roy J.	PFO
McHugo, Jack R.	BST
McKinzie, Wesley RN..N..N..N..N	GLC
McKinney, Oakley W.	LHV
McElin, Bertrand J.	PFO
McCord, Charles Gordon	SLR; Note 6
McAdow, Lewis H.	Note 2

M

Morrissey, Merle F.	DIK
Morgan, Stuart A.	SAG
Minturn, Benjamin E.	TFT
Moore, Rush I.	SAG
Morehead, John L.	SAG
Miskovsky, Robert J.	FRF
Magee, David W.	TFT
Mills, Harold W.	FOB
Mesnier, Edward S.	TFT
Mitchell, Henry G., Jr.	DMA
Mehlhop, Thomas P.	DIK
Meeker, Nathaniel H.	TFT
Magee, Christopher	DIK
Mowry, Jared J.	DIK
Morgan, Dwight C.	DIK
Marincik, Joseph A., Jr.	FRF
Murphey, Harvey W.	FRF
Micelli, Paul	FRF; TFT
Meyer, Jerome G.	FRF; DIK
Miller, Edward A.	FRF
Marriner, Alfred W.	CGC
Minter, Clarke C.	FRF
Myers, Carl H.	DIK
Miller, Ray E.	FRF
Matthiessen, Ralph H.	HHN
Mook, Harold F.	PMT
Merrick, Ward S.	FRF; DIK
Moffet, Ralph C.	SLR; FRF; AAD
Mahler, James B.	FRF
Macauley, Alexander V.	FRF
Manley, Harvey S.	FRF
Murphey, William Herbert	FRF
Martin, Roland H.	FRF
Montgomery, Edward G.	CGC
Merrill, Leland H.	AFO
Miller, Robert Lee	SLR; AAD
Martin, Burban A.	FRF
Mason, Richard A.	FRF
Merrill, Clyde Holahan	SLR; CAF
Murray, H. Sinclair	FRF; KST
Manzelman, Earl H.	BST
Morris, John E.	BST
Miller, Edward Frederick	SLR; AAD
Masson, Charles A.	DIK
Mills, Davis W.	DIK
Meisenheimer, Floyd B.	EOT
Meyers, Marion T.	PFO
Macomber, Henry W.	TFT
Morris, Edward S.	GLC
Minshall, Robert	TFT
Moye, Frank L.	GLC
Massey, Raymond R.	GLC
Merill, Keith B.	GLC
Mason, Clesson E.	FRF
Mosher, Ralph H.	FLR
Miller, Frank M.	FRF
Martell, Alfred	PFO
Metcalf, Herbert Edmond	SLR; SRC
Martin, Milton R.	DIK
Manley, Henry S.	DIK
Morthland, Merle A.	TFT
Maxwell, Fred C.	DIK
Murray, John G.	DIK
Machle, Jerome B.	TFT
Moss, Harry S.	TFT
Morse, Eugene D.	TFT
Moores, Edward A.	FRF
Means, Leland M.	SLR; AAD
Meldahl, Carl J.	GLC
Miller, George W.	BST
Martin, Howard C.	TFT
MacDonald, Walter Scott	FLR; Note 12
Mabee, Leroy Ray	SLR; Note 6

N

Nourse, Roderick	SAG
Nelson, Roy A.	DIK
Noyes, Linwood I.	FRF
Nunn, William T.	FRF
Neubauer, Arthur J.	AFO
Neubig, Earl E.	MAT
Newsom, Albert Sidney	SLR; CAF
Niblack, Polk H.	SBI
Nichols, Luther A.	GLC
Nigh, Gordon K.	FRF
Noyes, Charles M.	DIK
Nott, Sherrard G.	TFT
Nichols, George W.	EOT
Naumann, Arthur P.	TFT
Neely, Harold R.	DIK
Nordby, Julius Edwarl	SLR; Note 6

O

Otstot, Robert E.	CWT; MAC; Note 1
Orr, Douglas William	SLR; ALF
Orr, Harold E.	TFT
O'Neill Charles	TFT
Olin, Alfred L.	FRT; TFT
Olston, Frank M.	FRF
Osment, Horace	FRF
Otis, Thomas F.	KST
Orand, David Howard	SLR; HHN
O'Connell, Robert E.	GLC
Ort, Karl S.	GLC
Organ, John D.	LHV
O'Conner, Burdett Hitchcock	SLR; GLC
Ogden, James B.	SLR
Oglivie, Alexander K.	PFO

P

Pearcy, William H.	REL
Phillips, Robert F.	TFT
Parker, Herbert N.	TFT
Price, Owen N.	SAG
Payne, Owen S.	DIK
Patterson, Robert E.	TFT
Phillips, Donald B.	TFT
Perry, Maurice R.	DIK
Pearson, Russell H.	DIK
Prior, Rodger W.	DIK
Pritchard, Chester E.	FRF
Parkhurst, Amos J.	FOB
Packard, Harold A.	FRF
Pliska, John S.	LDT
Penfield, Charles C.	SAG
Plettner, Walter E.	SBI
Porter, Oscar S.	FRF
Pendleton, Talbot T.	BFT
Pye, Harvey N.	DMA; CGC; Note 1
Peterson, Fred R.	DIK
Paynter, Henry Martyn, Jr.	SLR; FRF; AAD
Putnam, Marion G.	CWT
Perkins, John M.	FOB
Pierson, Stanley H.	DIK; FRF
Plummer, William L.	GLC
Price, Simeon T.	CGC
Pendleton, Littleton F.	FRF
Paulson, Carl F.	KST
Peterson, Vance C.	KST
Peterson, Roger F.	FRF
Potts, Edwin Bernard	CSO
Polhemus, Josiah Arven, Jr.	SRL; PFO
Pinkstaff, Everett W.	EOT
Porterfield, James K. T.	FRF
Perry, William L.	DIK
Prior, Emery C.	FRF
Pitts, Younger A.	GLC
Philips, Paul H.	EOT
Park, James W.	DIK
Payne, Bryan W.	FRF
Potter, Duncan M.	LHV
Page, Henry L.	BST
Pratt, Eric T.	PFO
Parsons, Gustav A.	GLC
Pennefather, J. Sheridan	FLR; Note 16; WDM

Q

Quinlan, Charles G.	FRF
Quinneen, Charles R.	LHV

R

Radcliffe, Harry E.	DMA
Rogers, Henry S.	FRF
Ray, Harvey T.	SAG
Russell, Laurence L.	SAG
Rome, Robert C., Jr.	DIK
Robertson, James B.	TFT
Robinson, Malcolm G.	SAG
Reasoner, Nathan R.	FOB
Russell, Ralph C.	FRF
Redman, Mark H.	CWT
Roche, Felix R.	WFO
Reid, Kenneth M.	TFT
Richardson, Ernest L.	PFO
Reed, John S.	FRF; DIK
Rhine, Mel	SLR; PMT
Rice, Hubert M.	FRF

(*Continued on page* 931)

nd tents. (Photo by The Miller Studio and Press Illustrating Service)

A GRUMBLE ABOUT GLUE

By LT.-COL. MERVYN O'GORMAN, C. B. D. Sc.

IT is often overlooked that intense study of detail is essential to aeronautical progress, and I have chosen this subject by way of illustration. Of all unpromising subjects for an article, I suppose "glue" may be said to occupy almost a premier position. Let us, however, venture upon it to see if it offers any field of suggestiveness.

Glue, if we had the ideal thing, brings in the possibilities, so valuable in war, of high-speed construction and of labor economy. It also makes for an appreciable saving of wood.

Ply wood constructions of various kinds, by reducing the amount of steel and of machined and pressed metal parts in aircraft, tend to expedite manufacture. They do not add to the weight or to the labor of erection of the components using ply wood; on the contrary. Moreover, they do more than add an element of high speed in manufacture and light weight in the finished article, they permit us to get, by means of the circular cut, sheets of material larger and much wider than the original tree. This advantage in the size of the raw supplies available will become more precious as aircraft become larger. Ply wood thus is a very valuable aircraft material already, but its full utility can only be secured by the development of a proper adhesive between the plies. I am well aware of the excellence of the current product, but I am asking that we shall aim much higher. The gap to be bridged between our glueing possibilities of today and a real adhesive is handsomely illustrated by the existence of the elaborate and expensive process of sewing mahogany boat and seaplane hulls with copper wire. To effect a durable union of parts to compete with such copper sewing is our ideal.

For wing spars what we want, and what will always be valuable, are uniform pieces of great length. We have such timber, but we waste it. When we have, at great cost, secured a straight-grained and knotless tree, and picked out the prime cut, we turn 30 per cent of it into wood shavings and chips. The H type girder of spruce, made for lightness by "spindling" out the sides of the beam, expends more spruce and produces more scrap wood in the form of shavings, than if the same tree were cut into thin planks and the spar built up of flat top and bottom members connected by a webb artificially fixed in position. Just now we rarely use girders with screwed and glued sides either of ply woods or thin boards.

The ultimate ends of glueing is to produce a correct representation of a continuous piece across the glued joint. If good mechanical connection could be made betwen the top and the load was distributed to all parts a swell as in the spindled spar, and if this connection could be made tenacious by firm glueing, we should always add on bits instead of our present converse process of hollowing out large beams for the sake of leaving local excrescences. The relief obtained on the shortage in timber of good length (in excess of 12 or 20 feet) would be quite appreciable.

An adhesive for these and like purposes must give uniform performance as reliably as sugar gives sweetness, or else it cannot be used, save as capable of its lowest strength. Uniformity can not be expected unless it be prepared in accordance with some rigidly enforced recipe. It must consist of something approaching to a definite mechanical mixture of things, known to be susceptible of accurate reproduction, having a definite chemical composition or used in a definite physical state. If the chemistry of these colloids is too intricate for verification by the user's workshop methods we can approximate to the desired result by knowing first of all substances aircraft glue shall be made from. If it is based on fish bone or gelatine, etc., what fish bones or whence shall the gelatine be derived, and how prepared? If several substances enter into the glue, what are these preparations, and how mixed? There may be some danger in suggesting that a specification for the making of glue is needed to be enforced. I should far prefer that a specification should call only for results, not for composition, analyses of components, or methods of preparation. If a specification of results *can* be prepared, and can be currently enforced, this would be far less hampering to ingenuity and enterprise than a definition of components and treatment. I only plead that by one or the other of these means constancy of results must be attained.

Perhaps the greatest bar to progress in glueing is the difficulty of finding anyone who can say what is the result desired. Every carpenter thinks he knows; but get the matter put down in plain figures, and we find a result of zero intelligibility. Some tensile strength is needed, and it should remain when the glue is dry and set. What tensile strength *must* we have in the solid or dry glue specimen under test? When is glue dry? It is clearly no use asking for a strength equal to that of alloy steel in tension, compression, or shear. An expression of desiderata in any such over-exalted form produces no stimulus whatever to meet the want. Some power of permeating through the surface of a piece of wood is apparently needed of a glue; but we are not very sure even of this, since glue will connect together two pieces of glass so that the glass tears away before the glued faces part. I am quoting Dr. Walpole, but I believe the fact is common knowledge. It is unlikely that permeation of the glass by the glue had occurred. Suppose, however, that the permeating quality by which the solvent of the glue (water usually) carries the adhesive into the grain and interstices is recognized as valuable; can this permeating quality be measured? Does it fall off with dilution, and also with excessive concentration? Is it the same for any one glue solution with all woods, and, if not, what are the differences desirable for different woods? What is the chief weakness of glue? Does it mainly fail in shear? When a glued joint is tested and described as "good because the face of the wood was pulled away without breaking the glue," does this really show that the glue was good? Or does it only show that the transverse strength of the wood itself was weakened by the glue which penetrated it? What about shock and the effect of shock—viz., vibrations transmitted in glue? Do these disintegrate it or crack it or crumble it, or is the crumbled state sometimes found in old glue joints that have parted exclusively due to micro-organisms which have altered its character? Must we keep out such micro-nuisances with a permanent antiseptic? And if so, what? I do not pretend that nothing is known on these points by the world of science, but it is sufficiently clear that very little of it has leaked out to the ordinary user.

Next, when we have got the glue, it seems likely that when used it should be applied at some standard fluidity and temperature. Whether this should be determined by the employment of a simple specific gravity bubble in the glue pot, such as is used in accumulators, or by some other simple shop expedient, is immaterial at present. There may attach no importance to fluidity and heat, for we certainly act as if they were very minor matters; but who has the proof, and, if a wide range is allowable, what are the limits? This is not all. It is probable that the make-up water for the glue pot should not be tap water, since it is hardly likely that the furry deposit of chalk, well known in the domestic kettle, can add either to the adhesiveness or tensile strength of the contents. Yet such matters must accumulate when the glue is permanently on the simmer.

The suggestion is then, first, for a research. A good physio-chemist's time for a year or so is involved. After that we might have standardization and some recognized good procedure for needed. We have to know how far minute dampness or excessive dryness of the wood at the time of glueing affects the glue which enters into the pores. What is it that facilitates or prevents the mechanical keying? Investigation would presumably be made on some glues which are already esteemed by the practical carpenters of the more careful aircraft manufacturers. The relation, if there be one, between the strengths in tension, compression, and shear of the glue itself should be found, and the effects of these qualities on the ability of the glue to form a good entry into the pores of the wood must be studied for the purpose of selecting which ever is the most satisfacory combination in practice. Supposing all this knowledge to have been sifted out, we must go further. A glue which will soften and swell slowly when exposed, say, for a month to cold water—*i.e.*, to the average English weather—will begin to let go. Can such glue be treated, after application to the wood, with some chromate or other substance for rendering it insoluble in water? Can we achieve this without detracting from its hold on the wood or its tensile or other properties? Can we call to our aid the effect of actinic light of other ether vibrations to effect a molecular change? Shall the ordinary glueing operations be performed in what a photographer calls a dark room? I believe that attempts have been made to introduce the chromate into the glue before its application to the wood, but I think experience showed that such admixtures render the glue difficult to handle, and lead to wastage of that material which happens to remain behind in the glue pot.

The investigation, which I think is already in hand at the R.A.F.—viz., to discover what ingredient can be added to glue without spoiling it, to prevent it becoming a culture ground for micro-organisms, is very important. Micro-organisms enter and breed in moist glue, consume it, and turn it largely into water. They are enemies and should be excluded, so far as one can say at present.

The programme of work sounds a very large one. It is, perhaps, less arduous than it sounds if there exists already, as may be surmised, a good deal of knowledge secreted in the odd corners of British industries, as, for example, amongst cabinetmakers, makers of hollow ships' spars, and amongst those who apply veneers, etc.

We are by no means tied down to *glue* any and all gums, gelatines, colloids, are open to use. Shellac has its possibilties, and is exceedingly water-resisting. Provided the result is achieved, I do not think we need worry whether this result is obtained by means of gums or Portland cement or plaster or starch paste or any device which will stick together the things we want to stick.

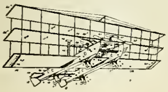
In aeronautics we are in a branch of engineering as novel as once was dynamo design. Electrical engineers grumbled in their earlier days at the hard lot which obliged them to transmit a hundred horse power through a complex of soft copper, cotton, sealing wax, varnish and tape. These *un*-mechanical substances were a persistent source of trouble. Now the business of making and using insulations has advanced to such a pitch that there is no machine so little liable to failure as a dynamo or alternator. The aeroplane is now in a position analogous to that of the Elephant dynamo or the Brush arc lighter. We expend 600 h.p. on forcing a structure of sticks and linen through the air—a glorified power-driven umbrella. The fastening of the linen to the sticks by countless little brads is testimony not only to our ignorance of adhesives, but to the fact that we badly want them. The sooner we start inquiry scientifically into this matter the better for us all.

RECENT AERO PATENTS

BY WILLIAM N. MOORE

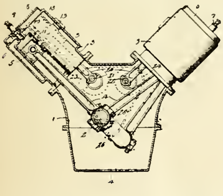
1,263,676. HYDROTRIPLANE FOR ARMY PURPOSES. Martin Jelalian, Cranston, R. I. Filed December 3, 1917. Serial No. 205,044. (Cl. 244—13.)

1. An apparatus of the character described, a hydrotriplane comprising of two main body sections or cars located side by side and extending longitudinally to each other, each of said body sections consisting of three metallic frames having a series of vertically arranged connecting supports surrounding the same, a wire netting secured to said supports of each of said cars and a layer of emery cloth secured to the latter, a small plane arranged between said cars and the ends of the same being secured to the middle frames of the same, and said small plane made of a series of connecting supports, a wire netting and a layer of emery cloth secured to the same, planes projecting outwardly from the middle frames of said cars and having buoyant cylinders secured upon the bottoms thereof.



1,261,530. INTERNAL-COMBUSTION ENGINE. Henry J. Hickey, Fort Dodge, Iowa. Filed Apr. 27, 1917. Serial No. 164,987. (Cl. 123—55.)

1. In an internal combustion engine, a crank case, a crank shaft journaled therein, cylinder blocks arranged in V relation to each other and each embodying an inclined combustion chamber and inlet and exhaust chambers which communicate with the combustion chamber through separate ports both located immediately adjacent to the cylinder head, reciprocatory pistons in said cylinders connected to said crank shaft, piston valves mounted to reciprocate in said inlet and exhaust valve chambers, parallel rotary valve shafts journaled within the crank case, connecting rods between said valve shafts and the piston valves, and driving means between the crank shaft and said valve shafts.

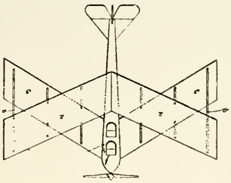


2. In an internal combustion engine, a crank case, a crank shaft journaled therein, cylinder blocks arranged in V relation to each other and each embodying an inclined combustion chamber at the outer and lower side of the block, and inlet and exhaust chambers at the inner side of the block, reciprocatory pistons in said cylinders connected to said crank shaft, piston valves mounted to reciprocate in said inlet and exhaust valve chambers and each provided with a through port, parallel rotary valve shafts journaled within the crank case above the crank shaft, connecting rods between said valve shafts and piston valves, sprocket wheels on said valve shafts, a sprocket wheel on the crank shaft, and a chain extending around said sprocket wheels for transmitting motion from the crank shaft to the valve shafts.

1,264,037. FLYING-MACHINE. Rupert A. Emmons, Washington D. C. Filed April 5, 1916. Serial No. 89,091. (Cl. 244—12.)

1. A flying machine having supporting planes so arranged that during one or more longitudinal angulations of the machine with respect to its line of flight, the wings of one or more planes will present to this line of flight a negative dihedral, and the wings of one or more other planes will present to this line of flight a positive dihedral, and the wings of these planes will be so arranged that those presenting a negative dihedral to the line of flight will be raked outwardly and rearwardly, and those presenting a positive dihedral to the line of flight will be raked outwardly and forwardly.

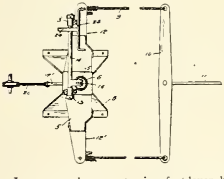
2. A flying machine provided with supporting planes, the wings of certain of these planes being dihedrally angled downwardly and raked to the rear, and the wings of other of these planes being dihedrally angled upwardly and raked to the front.



12. A flying machine having a supporting surface of which certain wings or lifting planes or sections of lifting planes are dihedrally angled in an outward and upward and forward direction, and of which certain other wings or lifting planes or sections of lifting planes are dihedrally angled in an outward and downward and rearward direction.

1,264,498. CONTROLLING DEVICE FOR AEROPLANES. James C. Foley, Seattle, Wash., assignor to Boeing Airplane Company, Seattle Wash., a Corporation of Washington. Filed January 16, 1918. Serial No. 212,026. (Cl. 244—29.)

2. In an aeroplane, the combination with the rudder thereof, a foot lever operatively connected with said rudder for steering purposes, another operative part of the aeroplane, a treadle device mounted on said foot lever to be oscillated therewith, and operative connections between the pedal device and said operative part whereby the latter may be selectively controlled through the instrumentality of the pedal device from any position of the foot lever.



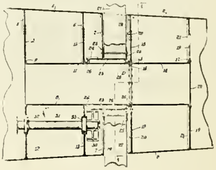
5. In an aeroplane, a steering foot-lever having a tubular fulcrum, a standard having a journal bearing for said fulcrum, a throttle valve, a pedal device mounted on said foot-lever, and operative connections between said pedal device and the throttle valve, said connections including a torsional rod extending through said tubular fulcrum.

(Claims 1, 3, and 4 are not printed in the Gazette.)

1,262,660. AEROPLANE. Edson F. Gallaudet, Norwich, Conn., assignor to Gallaudet Aircraft Corporation, New York, N. Y., a Corporation of New York. Filed April 21, 1916. Serial No. 92,597. (Cl. 244—25.)

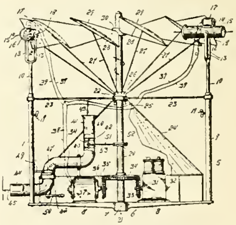
3. In a flying machine, a hollow pisciform body, a plurality of gas engines mounted side by side within the body, a radiator for the engines set across the interior of the body forward of the engines, a propeller mounted within the body to the rear of the engines with blades projecting outwardly through a transverse opening in the walls of the body and adapted to draw air through the radiator and past the engines, and means for operatively connecting one or all of the engines with the propeller.

7. In a flying machine, an elongated hollow body of substantially stream line form divided transversely into front and rear sections, a hollow cylindrical drum rigidly mounted within the rear end of the front body section, a propeller mounted to rotate upon the drum immediately behind the rear end of the front body section, a driving shaft geared to the hub of the propeller and mounted to rotate in bearings rigidly secured between the drum and the walls of the body section, and means for securing the rear body section to the drum immediately behind the propeller.



1,264,712. AERIAL APPARATUS. Howard P. Tweed, Denver, Colo., assignor to Benjamen F. Seymour, Denver, Colo. Filed Oct. 12, 1908, Serial No. 457,289. Renewed September 29, 1917. Serial No. 194,084. (Cl. 244—19.)

2. In aerial apparatus, the combination with a suitable frame work and a propeller equipped with blades, of means for operating the propeller and independent means adjustably mounted on the frame work and lying between parallel planes cutting the zone of rotation of the blades at right angles to the axis of the propeller, for menchanically discharging air currents into the path of rotation of the propeller blades for creating auxiliary atmospheric resistance.



15. The combination of propeller blades initially operated by any suitable power, with means independent of the blades themselves and lying between parallel planes cutting the zone of rotation of said blades for delivering resistance fluid to the zone of rotation of the propeller blades for the purpose set forth.

[Claims 1, 3 to 14, and 16 not printed in the Gazette.]

Offers to Fly to Europe

The Aero Club of America, pursuing plans for the projected transatlantic aeroplane flight, have announced that they have received a number of offers from American aviators to undertake the flight. In addition to these they have received one from Clifford Prodger, an American aviator, at present living in England. In his message Mr. Prodger says that he is willing to undertake the flight by way of the Azores.

FOREIGN NEWS

FRANCE

The French official report for July 8 said:

On July 6 and 7 fourteen enemy aeroplanes were brought down or put out of action and two captive balloons were set afire. Our bombing machines dropped eight tons of projectiles in the course of their expeditions at night in the neighborhood of Fismes, Hirson, Fere-en-Tardennois and Amagne Luquy.

GREAT BRITAIN

Our balloons and observation machines carried out much valuable work on July 6. There were few combats in the air. Three German aeroplanes were destroyed and one was driven down out of control. One of our machines is missing. Seventeen tons of bombs were dropped on various targets.

On the afternoon of July 6 our squadrons successfully attacked the railways at Metz-Sablon. Two and a half tons of bombs were dropped on this objective. Our formations were attacked over the objectives by enemy machines, one of which was driven down. All our machines returned safely.

During the night of July 6-7 our machines successfully attacked the railway station and sidings at Saarbrucken and railways at Metz-Sablon.

Hazy weather interfered with the work in the air on July 7 and observation was difficult. Seven enemy aeroplanes were destroyed during the day and four were driven down out of control. Three of our machines are missing.

We dropped sixteen tons of bombs during the day and the following night, the principal targets attacked being the Ostend docks and the railways at Tournai and Courtrai.

The station and factories at Kaiserslauten were attacked. Hostile machines were engaged over the objectives and one of them was shot down.

On July 8 the railway station, workshops and sidings at Luxemburg were bombed by our squadrons. Bursts were observed in the station and also in the workshops.

In spite of low clouds in the morning of July 8 and thunderstorms later in the day, our aeroplanes accomplished a good deal of photographic, observation and reconnaissance work during the intervals of fine weather. The enemy activity in the air was slight.

Seven German machines were destroyed and six driven down out of control. Four of our machines are missing.

Nineteen tons of bombs were dropped, principally on railway connections, at Roulers, Tournai and Wavrin, and on dumps at Warneton and Bac St. Maur. Practically no flying was possible at night.

British naval aeroplanes in the period between July 4 and July 7 dropped six tons of explosives on German works at Ostend, Zeebrugge and Bruges. Direct hits were observed on buildings and vessels. Five German aeroplanes were destroyed and three others were driven down out of control. All the British machines returned.

In air battles along the northern British front on July 10th, according to an official statement, nine German machines were destroyed and one other was driven down out of control. A hostile scout also was brought down by anti-aircraft fire.

British bombing parties dropped explosives on various enemy targets, including Lille Junction and the Bruges docks. Three British machines failed to return.

The British air raid on Coblenz July 12th was the severest of the war, according to a Basel dispatch to the *Express*. Twelve persons were killed and twenty-three injured

The northern part of the station was seriously damaged and the Rhine and Moselle bridges and the royal palace were hit. Great damage was done to thefortress of Ehrenbreitstein.

Bad weather conditions interfered with aerial activity on July 11 and 12, and only five German aeroplanes were accounted for by the British on those days, the Air Ministry announced. Three British machines were lost. More than nine tons of bombs were dropped.

"On July 11, heavy rainstorms limited activity in the air on both sides, but our machines carried out reconnaissance work and observation for the fire of our guns whenever brighter intervals permitted," the statement said.

"Nine tons of bombs were dropped on railway junctions behind the German lines. Three hostile machines were destroyed during the day and two were driven down out of control. Three of our machines are missing.

"During the night of July 11-12, our machines successfully bombed three enemy aerodromes, at two of which fires broke out. Many rounds were fired from machine guns at trains, searchlights and other military objects.

"On July 12, the railway sidings at Saarburg were attacked. All our machines returned safely."

Twelve enemy aeroplanes were destroyed by us on July 13, and four were driven down out of control. Three of our machines are missing.

A good deal of reconnaissance and observation work was carried out by our airmen in the intervals, and four and a half tons of bombs were dropped by them during the day.

On the night of July 13-14 our bombing machines were very active. Over 1,100 bombs, weighing in the aggregate nineteen tons, were dropped upon enemy camps, railway lines, trains, transports, and billets. All our night-flying machines returned safely.

GERMANY

The official communication issued by the German War Office on July 14th follows:

"Our bombing squadrons made night attacks against enemy railway works on the French coast between Dunkirk and Boulogne. At Abbéville, and in the regions of Lillers, St. Pol, Doullens, and Crépy-en-Valois and at Villers-Cotterets."

The headquarters report has this to say of recent aerial operations:

"During June 468 hostile aeroplanes and 62 captive balloons were shot down on the German front. Ninety-two of these aeroplanes were brought down by our anti-aircraft guns. Of these aeroplanes 217 are in our possession. The rest were observed to fall behind the enemy positions.

"We lost 153 aeroplanes and 51 captive balloons in battle."

The Germans reported that eighteen enemy aeroplanes were shot down on July 9, and that on July 11 " Five American aeroplanes of a squadron of six, intending a raid on Coblenz, fell into our hands. The crews were taken prisoners."

ITALY

The Italian War Office reported on July 8:

Eight hostile machines were brought down in air fighting.

The air superiority of the Entente Allies on the Austro-Italian front is indicated by the figures made public on July 8 dealing with the ten days' offensive of the Austro-Hungarians in June. The Allies, including American pilots, operated 120 chaser planes and destroyed 107 Austrian aeroplanes and seven observation baloons. The Allies losses were seven aeroplanes brought down in the enemy lines and three balloons. Three Allied pilots were killed, six were wounded and seven are missing.

Three thousand observation photographs were taken and 5,000 bombs, weighing seventy tons, were dropped by Allied airmen. Italian observation balloons signalled nearly 4,000 positions of enemy artillery and directed the fire of nearly 1,000 guns.

ENGLAND

A despatch from London dated July 2nd says: "Young Germans learning to fly are deserting into Holland wholesale.

"Whole batches of German pilots training at Nivelle in Belgium," says a British official statement, "secreted stores of petrol and flew across the Dutch frontier, where they were surrounded and interned."

The reason for these defections, it is learned, are that wastage among German aviators has forced the army authorities to coerce recruits, that the coerced recruits find the "intensive training" intolerable, and that training accidents abound.

A later dispatch sends the following: Three more German airmen, deserting their country, have landed in a giant seaplane at Masnedsund, on the island of Masnedo, off the south coast of Seeland, Denmark.

The machine belonged to the second German battle fleet and bears the number 21 B. There were no arms or ammunition, or even telescopes on the seaplane, which indicates that the nature of the airmen's flight was surreptitious.

Like to Keep War Restricted

Amsterdam—Rumors are being circulated here that Germany is considering a proposal to the Allies that a mutual agreement be reached against bombarding towns outside the war zone. The sentiment in favor of such a move is said to be strong in Germany.

German Airmen Kill Nine Women in Hospital Raid

London.—Nine young women, members of the Women's Auxiliary Army Corps, were killed in the German bombing raid on British hospitals in France May 30th.

German Aeroplane Lost Off the Jutland Coast

Washington.—A German aeroplane was lost off the western coast of Jutland on July 4th with its crew, according to an official dispatch from Copenhagen. The plane was one of a squadron of four flying at full speed toward the South, and was seen from the shore to fall. Danish lifeboats went to the aid of the aviators, but could rescue none.

GREAT BRITAIN

British Airman Also Bagged Six German 'Planes in One Day

Captain John L. Trollope, the young British airman who established a world's record by bringing down six enemy machines in one day, is a prisoned and wounded, according to news received by his parents. He had been reported missing.

FRANCE

Versailles Discussion End with Order for Attacks on Battlefront Only

The "Echo de Paris" says it learns that the question of the unity of tactical and strategical aims of the Allied aviation services was discussed at the recent meeting of the Supreme War Council at Versailles by the technical experts of the several nations represented.

From this it developed, adds the newspaper, that additional raids at present on German cities were not deemed advisable, as other efforts by the air forces were more necessary at this juncture, the view being that all the Allied aviation efforts should be centred upon the firing line and the territory behind the lines.

GREAT BRITAIN

Two Aeroplanes Locked Together in Mid Air

A thrilling story of a collision in the air was told at an inquest held by an Eastern Counties coroner on the body of Lieutenant Owen Hewitt Dampier Bennett, of the Royal Air Force and belonging to Birmingham.

A brother officer describing the collision said he was up about 700 feet, when Bennett flew over him between 300 feet and 400 feet higher and suddenly fell. Witness tried to get out of his way, but had not sufficient speed to clear the aeroplane. The nose of his machine jammed in the under carriage of Bennett's machine and they locked together. Both aeroplanes rolled over and over for 300 feet, and then witness's machine broke adrift, smashing the lower planes of the other, which crashed to the earth.

A verdict of "Accidental death" was returned.

Britain to Use Women in Her Air Forces

Employment of women as aviators is intended by the British Government, George H. Roberts, labor minister, declared in a speech at Sheffield while referring to the important part that women are playing in industry. The minister said he believed women would make very good aviators.

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

INHERENT stability is a problem that aeronautical engineers have tried to overcome since the first flight of the aeroplane, and up to now they have only partly succeeded in making the aeroplane stable.

Inherent stability means that no matter what outside forces act on the machine to throw it into a nose dive or a side slip, it will always come back to its normal position. The Burgess-Dunne, and the old German Taube were machines having inherent stability.

A machine of this type while possessing excellent qualities for sporting or commercial aeroplanes, works just the opposite when used for war purposes, because the fighting aeroplane must be of such design that it will answer readily to the will of the pilot, such as the strategical manœuvres a pilot must make to throw off, or overcome an enemy.

With a machine of the inherently stable type it would be hard to make an Immelman turn, loop, or corkscrew, because while the pilot would use his controls to throw the machine into the position he would choose, the machine itself would try to stay at normal and of course it would be sluggish, and useless for fighting, but as a sporting type or for commercial use this will be the type of machine in the future, as it allows the pilot to rest at times and he would then be able to fly many times the distance he could cover in a machine of the unstable type and without exertion.

By studying the examples shown in the accompanying drawing the reader will clearly see how an aeroplane can be designed to be stable.

Fig. 1 shows a model with wings set at what is known as a dihedral angle, just below the model, a front view of a boat with a "V" bottom is shown, how these two resemble each other in principle is shown at Fig. 2. The boat although thrown over on its side by a wave is still safe because the "V" bottom of the boat now presents a flat surface to the water and the centre of gravity will hold it in this position and when the wave drops off it will go back to normal.

The model above is in the same position as the boat, the cross wind, arrow A, is trying to turn the machine over on its side, it does so, until the left wing reaches a horizontal position, then the lift on this wing increases and the lift on the right wing drops off because it is now at an extreme angle and the machine returns to its normal position.

The reader will see that one wing is getting more lift than the other, naturally, the side getting the greatest lift will rise and the one losing lifting power will fall.

In Fig. 3, a machine of the unstable type is shown, and directly below it, a flat bottom boat, how these two resemble each other is shown at Fig 3. The wave lifts the boat over on its side, and having no flat side as in the "V" bottom boat, it is in danger of overturning. This is also the case in the model above it, the wind, arrow A, is lifting the machine over on its side, both wings are getting the same lift so there is no force trying to right the machine and the consequence is the machine starts to side slip and before long gets into the position shown in Fig. 5, and the pilot would have to use his controls to bring the machine back to its original position.

Now this is for lateral stability only. For longitudinal stability it is necessary to have the tail plane set at sort of "V" to the main plane.

Fig. 6 shows a model that is logitudinally unstable, because it has what is known as a lifting tail, and the machine has two forces to overcome the weight of engine, etc., arrow W and the lift of the tail, arrow B, the result is the tail starts to travel in the direction indicated by arrow C and before long would put the machine in the position shown in Fig. 8. The machine would then nose dive and travel in the direction shown by arrow R, because the lift of the elevator and main plane tends to keep the machine moving to the right and the weight of the machine keeps it moving down and the resultant is indicated by arrow R.

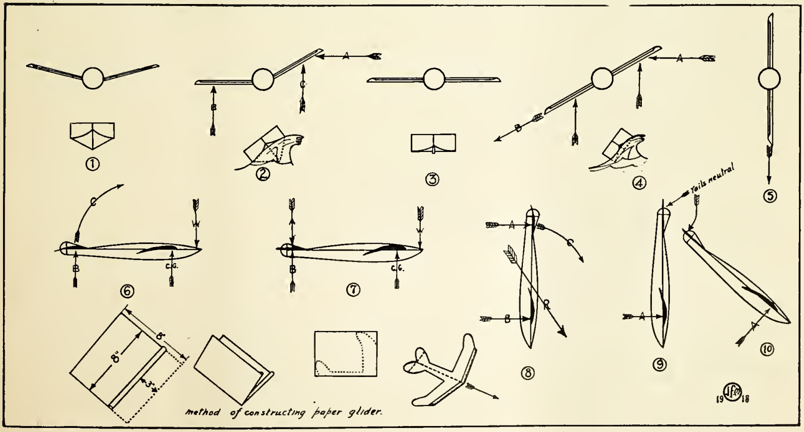
Figure 7 is a model having longitudinal stability because it is so designed that it does not need a lifting tail, instead it has a neutral tail acting somewhat as the feathered end of an arrow. The forces acting on this tail are equal, and the result is the tail remains neutral. Should the machine nose dive as Figure 9, the tail being neutral and the main plane having a lifting force which tends to move the nose to the right, the result is the machine soon arrives at the position in Figure 10, and eventually flattens out to its correct position.

Should the reader have any difficulty in grasping the explanations set forth in this article I would advise making a simple paper glider as shown at the bottom of the drawing. The glider is made from a fairly stiff sheet of ordinary writing paper, then one end is folded about 3 inches as shown. Now fold in half and cut to the shape shown by the dotted line.

When completed the reader should try various experiments such as throwing the glider upside down, spinning it around, or in fact any position at all and the glider will land right side up every time, showing that an aeroplane can be made absolutely stable.

The dotted lines across the tail flaps indicate where to bend in order to balance the machine.

(To be continued)



Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Now He Knows Who General Staff Is

A stranger hesitatingly walked into the War Department headquarters. He appeared embarrassed, swallowed hard a couple of times, and then said to Field Clerk A. J. Pitt:

"I would like some information. Can you tell me who this General Staff is that I've been reading so much about? I see his name almost as often as General Pershing's and I want to look him up in 'Who's Who.' I never heard of him before the war."

"General Staff is a brother to Corporal Punishment," replied Pitt.

"He is a cousin to Private Entrance," volunteered Clerk Frank Andreis.

Serious Predicament

Eager Lady—"But what if your engine stops in the air—what happens? Can't you get down?"

Aviator—"That's just what 'appens, mum. There's two Germans up over in France now with their engines stopped. They can't get down, so they're starving to death."—*California Pelican.*

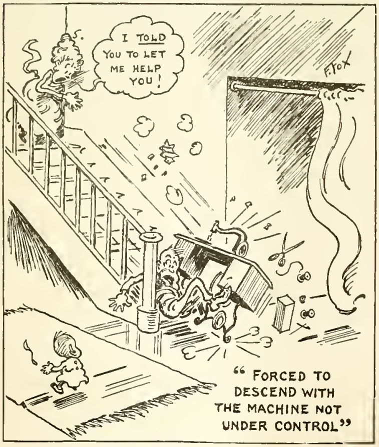
In Appreciation

By A. D. Pugh

Dedicated to Lieutenant Amos B. Emery and Jonathan H. Pugh, 28th Aero Squadron, A. E. F., France

May your head always work, your luck ever hold;
May always your plane be fully controlled,
May she never take fire or run out of grease,
Till the cows all come home, and the nations have peace;
May you dive through the clouds, and loop through the sky,
And not for a moment your motor quite die;
May you never fly up but that you fly down,
And never sideslip, banking close to the ground;
May you vanquish the Boche, and see the whole show,
And never, Oh never, your pancake be dough;
May your aim never err, your gun never jam,
And for Archies and bullets not caring a damn,
May you fly like the Eagle for freedom alone,
And always a victor return to the 'drome.

Illustrated War Phrases.


I TOLD YOU TO LET ME HELP YOU!
F. FOX
"FORCED TO DESCEND WITH THE MACHINE NOT UNDER CONTROL"

Courtesy Fontaine Fox and N. Y. "Evening Sun"

To a J. M. A.

(Apologies to Bryant)

Whither amid falling dew
While glow the heavens with bursting A.A. guns,
Far through its rosy depth dost thou pursue
The fleeing Black-Cross Huns?

Seekest thou he of the Masauran Lakes,
Or to strafe the Kaiser's hide;
Or where the iron crosses rise and sink
On Gen. Von Moltke's side?

Four hours thy planes have fanned
At that far height the cool thin atmosphere,
Volplaning now to the welcome land
Because the dark Hun is near.

But soon thy toil shall cease,
Soon shalt thou seek thy mail and mess,
And scream among thy fellows;
Brows bend no more now over thy chevron test.

Up in the Air

Mrs. O'Brien—Mrs. Murphy isn't washing to-day. I wonder what's the trouble?

Mrs. Rafferty—I understand that her son Tim took the clothesline and used it for a kite string.

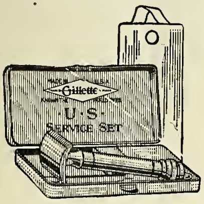
At Early Dawn

From the great high tower, at early morn:
I see the sun come up at dawn,
I see the stars go home to bed.
I hear the sea gulls overhead;
And then the flag goes up:
Which means for men to fly.
I hear the purr of a motor, she's on the step,
Then like a bird the seaplane passes by.
Up, up like a swift winged swallow
Up, up into the big blue sky.
Still they come, still they follow,
Men like birds learning to fly.
Across the bay, the bay so blue
Up, up in the cloud like dew.
She looks so silvery, sparkles bright.
A spiral, a dip and then a glide,
Then she touches the water light.
All day long they come and go;
Each man takes his turn,
There is so much to learn.
A cross wind test: then up, up they go
To shoot the boat:
Within a hundred feet of its side.
Then she touches the water light,
Taxis about, across the tide
And back to the hangar for the night.

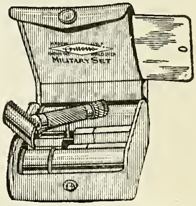
—*Elizabeth Ashmead Cantwell.*

May, 1918.

Gillette SAFETY RAZOR



The New U. S. Service Set—A solid metal case, heavy nickel-plated and embossed with the Insignia of the U. S. Army and Navy. Strong, thin, compact: 1⅝ inches wide, 4 inches long, ⅜ inch thick. 12 double-edged Gillette Blades (24 Shaving Edges). Contains a nickel-plated Gillette Safety Razor and Blade Box. Indestructible Trench Mirror inside the lid. $5



Military Set No. 18—For Uncle Sam's Officers, a Gillette Combination Set, in case of U. S. Regulation Khaki twill — nickel-plated "Bulldog" Razor; indestructible Trench Mirror fitted in pocket in lid; Shaving Brush and Stick Gillette Shaving Soap in nickel-plated Holders; two Blade Boxes; 12 double-edged Gillette Blades (24 Shaving Edges). $7

When a man lives in a place where he can't swing a cat, he comes naturally to a Gillette

The men with the colors, everywhere, know how to shave in 2x4 space—in "once over" time. They know the Gillette makes this easy. Cool, comfortable, and absolutely dependable—the *service razor* with millions of fighting men.

Have you seen the new Gillette Sets specially made for the fighting man? Two of them are illustrated on this page. They were designed by members of the Gillette Organization in the Service—men who know what the fighting man is up against.

Simple and compact, fit the pack, the pocket or the ditty box. No strops or hones to clutter up the kit. Blades always sharp, always ready. No Stropping—No Honing. When a man wants new Blades he can get them in any Post Exchange, Ship's Canteen, or Y. M. C. A. Hut, here in America or overseas.

Our Paris office carries stocks—is constantly supplying the American Expeditionary Forces. Gillette Safety Razors and Blades on sale everywhere in France, England, Italy, and the Eastern battle fronts.

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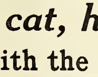
Montreal, P. Q., Canada

Gillette Safety Razor Societe
Anonyme
17 Bis, Rue La Boetie
Paris, France

Here's the Way to get 100% Efficiency Out of Your Gillette

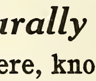
Try this when you shave tomorrow morning. Lather the beard thoroughly, and rub well in — that's essential with any shave.

Put in a new blade and screw the handle down *tight*. If you want a specially close shave, *unscrew* the handle a *part turn*.



Hold the razor *naturally* and *easily*, and tilt the handle so you can just feel the blade engage the beard.

Then shave with short slanting strokes. It doesn't require any brute force to shave with a Gillette—the razor does the work.



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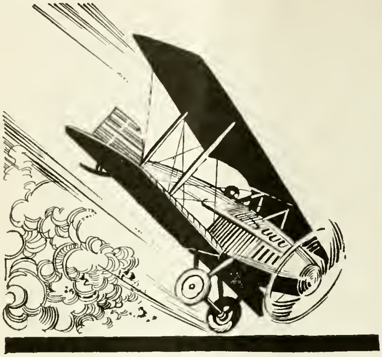

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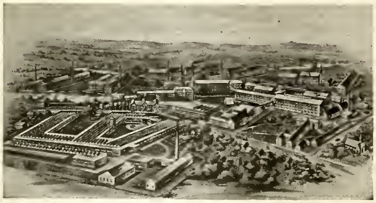
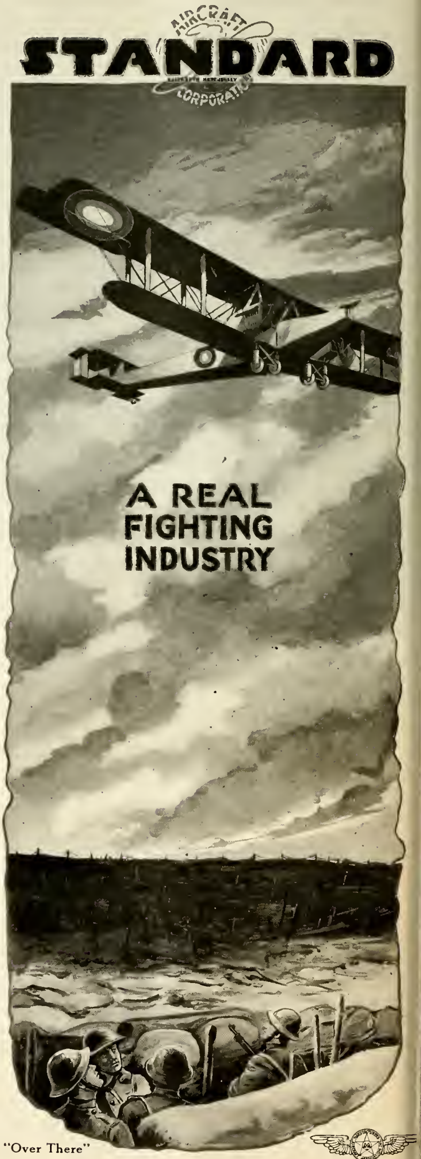


These 35 mills covering 450,000 square feet guarantee prompt, efficient attention to your requirements



"Over There"

(*Continued from page* 923)

Reed, John H.	KST
Regan, Harold J	FRF
Rafeld, Max L.	AFO
Riebe, Herbert F.	FRF
Redmond, Forest H.	FRF
Reeves, Robert H., Jr.	FRF
Ruddell, Noel C.	FRF
Rabineau, Franklyn L.	WAC
Rombough, Miles D.	DIK
Ripperger, Clarence Wesley	SLR; CAF
Reynolds, Arnold R.	DIK
Ready, James B.	FRF
Rhoades, Otto V.	DIK
Ryan, Richard M.	FRF
Rogers, Frank W.	TFT
Robinson, Clarence A.	PFO
Ringer, Albert R.	FRF
Ranson, John W.	FRF
Relf, Richard	SLR
Rhoades, Horace L.	FRF
Rowe, Harold D.	LHV
Rourke, Frederick W.	EOT
Richards, Curtis D.	CWT
Renwick, William G.	FRF
Reckefus, Charles H.	FRF
Reeves, Robert H.	DIK
Redmond, Forest H.	DIK
Robertson, Charles B.	EOT
Rowe, Elmer C.	DIK
Royer, James A.	TFT
Ringland, James T.	EOT
Rooney, James R.	EOT
Royster, Royall H.	TFT
Ryan, Robert E.	BST
Robinson, Clark	TFT
Riebe, Herbert F.	DIK
Rich, Don O.	FRF; TFT
Read, James K.	EOT
Rogers, John P.	EOT
Riddlesbarger, Rufus	TFT
Robinson, Ralph R.	DIK
Ridlon, John R.	Note 7
Rierson, Thomas Palmer	SLR; Note 6

S

Stout, Samued C.	FRF; BST
Sanders, James O.	TFT
Schroeder, Rudolph W.	MDO
Seymour, Leland S.	FRF; DIK
Stephenson, James R.	DIK
Stout, Minor Woolfolk	SLR; RWT
Slater, Joseph Marsden	SLR; TFT
Sattler, Walter F.	DIK
Stewart, James David	SLR; AAD
Still, Leslie E.	FRF
Spier, James E.	FRF
Sloan, Harry	SLR; RWT
Snyder, Gerald S.	FRF
Scull, Leo N.	DIK
Swain, Francis W.	FRF
Sporlein, Louise Wolfgang	SLR; AAD
Sweeney, Raymond W.	TFT
Smith, Albert D.	SBI
Selts, William A.	DIK
Strahan, Donald P.	TFT
Sheehy, John F.	FRF
Sullivan, James L.	FRF
Shope, Leslie R.	DIK
Smith, Howard	CGC
Schuler, George F.	FRF
Summerfield, Vernon D.	FRF
Smith, Jerome T.	MAT
Smart, Oliver M.	PFO
Smith, Warner G.	PFO
Scherck, George	DIK
Smith, Edward L.	FRF; TFT
Stitt, Donald G.	TFT
Schmocker, Fred C.	FRF
Seaver, Lloyd Badger	SLR; PMT
Schroeder, John, Jr.	KST
Steele, Dudley M.	SBI
Skoning, John H.	DIK
Sain, Ben	FRF
Starbuck, Samuel T.	FRF
Swanson, Leonard F.	FRF
Sullivan, Denis Joseph	SLR; CAF
Stocking, Sidney S.	FRF
Spainhour, Carl Michael	SLR; PMT
Stuart, George Dayton	SLR; LDT
Swain, John D.	MAT
Silverman, Michael Mitchell	SLR; RWT
Schroyer, Malcolm E.	FRF
Surateux, John L.	FRF
Scott, Robert Chalk	DIK
Steele, James Jesse	DIK
Steedman, Charles R.	FRF
Smith, Cyril J.	PFO
Sullivan, Charles B.	DIK
Stegall, J. Rex	BST
Smith, Thomas J.	FRF
Shepard, Floyd W.	FRF
Simmons, Frank H.	FRF
Sears, Hugh A.	EOT
Starring, David S.	EOT
Schuler, Dement	GLC
Smith, Lowell R.	GLC
Shaw, James M.	EOT
Stoffer, Charles T.	EOT
Sparks, Walter Russell	SLR; LDT
Stutzman, Theodore B.	DIK
Scott, Neal J.	BST
Smith, Hart G.	DIK
Spang, Joseph P., Jr.	FRF
Smock, Harold E.	TFT
Schwartz, Charles W.	FRF
Savoye, Charles Ulysse	SLR; PFO
Spangler, Earl O.	DIK
Sargent, Carl A.	GLC
Sievering, Philip J.	GLC
Savage, Joe W.	WFO
Steel, John A.	WFO
Strother, Samuel P.	DIK
Smith, Harold D.	TFT
Shove, John D.	GLC
Schenck, John T.	LHV
Sanders, William C.	GLC
Simpson, George L.	BST
Sibbernsen, Albert H.	EOT
Symons, Thomas W., Jr.	FRF
Stryker, Walter William	SLR; PMT
Strattan, Abram G.	FRF
Shrader, Harlan L.	TFT
Smythe, Allen M.	TFT
Sherwood, Lyman W.	LHV
Sommer, George C.	ELA
Swain, Roland H.	EOT
Spencer, Vernon W.	PFO
Stinson, David R.	DIK
Soto, Earle	WFO
Saint Clair, Gordon C.	TFT
Searle, Piatt F.	WFO
Sharpe, Carl E.	WFO
Smith, Rallph Walter	SLR; Note 11
Smith, Kenneth W.	Note 14
Stembridge, Alfred R.	Not 5
Scott, William, Jr.	SLR; Note 6

T

Thornburg, David W.	FRF
Taylor, Howard S.	KST
Tinsley, George C.	FRF
Tenhope, Jerry J.	FRF
Tibbals, Earl B.	EOT
Teigen, Carl P.	MAT
Tower, Robert R.	FRF
Thomas, Charles B.	FRF; TFT
Thierbach, George Charles	SLR; RSD
Tuller, Maurice E.	TFT
Thomas, James R.	DIK
Tilton, James F.	FRF
Thompson, Herbert P.	TFT
Tabor, Paul	FRF
Thorne, Harold Wooster	TFT
Temple, Paul N.	FRF
Trewin, Harold R.	FRF
Trider, George H.	DIK
Taylor, Russell L.	DIK
Thorum, Elmer George	GLC
Turrill, Gardener S.	FRF
Ten Eyck, Charles A.	FRF
Thomas, William A.	PFO
Trezona, Lewis Rodda	SLR; LDT
Tompkins, Calvin, Jr.	GLC
Truscott, Arthur S.	WFO
Taylor, Frederick H.	GLC

V

Vandenberg, Byron F., Jr.	DMA
Vickery, James C.	FRF
VanderVoort, John M.	TFT
Van Veghten, Theodore S.	TFT
Von Derau, Ralph A.	WFO
Van Tine, Agnew Kennedy	SLR; PFO
Vance, Alfred W.	FRF
Vause, Norman J.	EOT
Vaden, Ferris E.	PFO
Van Dennis, William	Note 2

W

Weisbach, Arthur H.	TFT
Wages, Charles Sylvester	SLR; FSO
Wennerholm, Charles A.	VBW
Walker, Clyde LeGage	FRF
Wuchter, Stanley A.	FRF
Whitehead, Eugene C.	KST
Wooldridge, Henry E.	DIK
Warren, Edward W.	TFT
Webb, James E.	TFT
Wellford, Armstead L.	FRF
Whiteside, Rush S.	DIK
Walker, Ralph G.	FRF; BST
Wing, Charles R.	FRF
Wolf, Ninian L.	MAT
Wadsworth, Phileman T.	PFO
Wren, Samuel M.	DIK
Wing, Leo	FRF
Wallis, James C.	FRF
Wall, Edward B.	MAT
Walker, Franklin C.	DAP
Winter, Henry Clarence	SLR; RWT
Willrich, Edgar G.	SBI
Wallis, Edmund Crenshaw	SLR; CAF
Warde, Wilfrid B.	FRF; DIK
Wascher, Frank E.	KST
Walker, Henri D.	FRF
Weightman, John A.	TFT
Woodard, John D.	CWT
Weiser, Victor A.	LHV
Waltemate, Louie F., Jr.	FRF
Webb, James E.	FRF
Warren, Francis E.	WFO
Williams, Richard E.	WFO
Weinstein, Carl I.	EOT
Williamson, Cleburne M.	LHV
Walker, Albert K.	TFT
Williams, Edwin M.	FRF
Wine, Edward A.	WFO
Woodcock, William Irvin	SLR; PMT
Wiegman, John P.	FRF
Welles, Charles B.	FRF
Wheeler, Oliver P.	FRF
Waller, Lawrence J.	DIK
Westerhaus, Luther W.	TFT
Welch, Paul R.	TFT
Willson, Abner R.	SLR; GLC
Weiland, Stanley M.	Note 8

Y

Young, Joseph S.	MAT
Yerby, Walter T.	FRF
Young, Henry M.	DIK

Z

Zingermann, Ernest L.	FRF
Zettel, Raymond C.	DIK
Zender, Frederick A.	KST
Zanetti, Silvio	DIK
Zander, William E.	TFT
Zane, Robert T.	FRF

(*Continued from page* 911)

Liberty Motor Best in Europe, Says Sims

Washington.—Secretary Daniels authorizes this statement:

"Secretary Daniels has received a despatch from Vice-Admiral Sims stating that the recent tests of a seaplane equipped with the Liberty motor resulted in 'better performance as regards climbing and load carrying' than similar aeroplanes equipped with one of the best types of European engines. Admiral Sims says: The British expressed great confidence in the Liberty motor."

Aeroplane Catches Fire in Air, But Aviators Land Safely

Hartford, Conn.—Lieutenant F. H. Bentley of the Aviation Service, and his mechanician, Sergeant Harold Akins, had a thrilling experience while flying over Hartford when their aeroplane took fire while about 2,000 feet in the air. They landed uninjured, having put out the fire on the way down, before the machine had been seriously damaged. They were bound for Mineola, L. I.

Col. E. G. Buckner Speaks to Du Pont Employees

At the recent sales convention at Atlantic City, of E. I. du Pont, de Nemours & Co., Col. E. G. Buckner spoke to several hundred of the employees of the corporation. He spoke on the story of achievement which the present war had brought about in the industrial lines of the country. He presented a startling array of figures and gave a vast amount of inside information about the company's share in the war for civilization. He showed that though the work done by the company in supplying powder to the Allies has been credited more than once with having saved the British Empire, it was even more important to this country in that it laid the foundation on which rests a certain and adequate supply of explosives for our own boys "over there." He gave the credit to efficiency and organization and paid a compliment to the staff of the company for their faithful work.

New Aeroplane School

Mr. William Cook, consulting engineer, until lately with the Dewey Aeroplane Company, has established a training school and factory at Independence, Kansas. The Independence Aircraft Company, as the new concern is called, have secured a very favorable site. They have one military tractor on the field now and have two others almost completed. Mr. Cook, the manager, has as his chief instructor Elling O. Weeks, a licensed pilot who commenced flying back in 1909.

Wright-Martin Production 25 a Day

New York.—The Wright-Martin Airplane Corp. is reported to be producing engines at the rate of 25 a day, this being an increase of 5 a day over the production a month ago. It is expected that the new plant in Long Island City will be ready for operation soon and that production will be brought up to 50 engines a day before the end of the year.

Thomas

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N.Y. U.S.A.

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Major Mitchel's and Gino's Funerals Impressive Ceremonies

NO feature of the funeral of Major Mitchel on July 11 was more impressive than the part taken in it by the twenty-three aeroplanes of the First Provisional Wing, from Mineola, under command of Major C. K. Rhinehardt, assisted by Major W. H. East, in charge of formation, and Lieutenant Frank D. Davidson, flag leader.

In three groups of six each the machines soared over lower Manhattan from City Hall to St. Patrick's Cathedral, their sides sparkling in the bright sunlight. Above these three groups at a height of 5,000 feet flew three reserve machines. In the event of any of the aeroplanes in the groups having to drop out of formation these reserve machines were to take their places in the line.

Persons throughout the city and the metropolitan district unable to go to Fifth Avenue to pay their respects to the dead watched the flight of the aeroplanes from windows, roofs, the streets and the parks. They felt that they were in reality a part of the great throng in actual attendance at the funeral. Perhaps, from this point of view, no funeral in New York was ever participated in by so many persons.

In the first division of six machines were Lieutenants Davidson, Kelleher, Reitenbaugh, King, Connell and Boyd; in the second, Lieutenants Welch, Sherman, Longstreet, Lockwood, Himman and Boggs; in the third, Lieutenants Roullot, Hump, Houser, Pierson, Henderson and Brokmeyer. The three aeroplanes that soared at a higher level were manned by Lieutenants Halley, Garrett and Krieger.

Besides these there were two other machines, manned by Lieutenants Carroll and Martin and Lieutenants Clark and Brenner, whose mission it was to fly here and there, dropping flowers, and then to proceed to Woodlawn Cemetery, to hover over the final service. It was from the machine occupied by Lieutenants Clark and Brenner that three clusters of American Beauties were dropped in front of St. Patrick's Cathedral.

After participating in the Cathedral ceremony the two machines went to Van Cortlandt Park, where they took on a fresh supply of fuel. Upon a prearranged signal they flew to Woodlawn Cemetery and dropped flowers onto the mourners gathered about the grave.

Two wagonloads of flowers were dropped on New York. They were furnished by Mr. and Mrs. Henry Payne Whitney, Mr. and Mrs. Payne Whitney, Mr. and Mrs. Robert Bacon, Mr. and Mrs. John S. Phipps, Mr. and Mrs. Charles Steele, Mr. and Mrs. E. D. Morgan and other residents in the vicinity of Mineola.

Sergeant Gianfelice Gino, noted Italian aviator, was buried on July 10th with high military honors. The fighting flyer, who won fame for his exploits above the battle lines in France, received the tribute of officers representing all the Allies. He was killed in an accident at Hazelhurst Field.

Solemn requiem mass was sung in the Church of Our Lady of Loretto in the presence of a large body of officers and flying men. Thirty officers from Hazelhurst Field and 200 cadets of the First Provisional Wings stood at attention when the body was carried to the hearse. Italian officers bearing the flags of Italy and the United States stood in line beside the hearse while the bands of the Forty-second and Forty-third Field Artillery regiments from Camp Mills played "Nearer, My God, to Thee."

As is the custom at military funerals on the battlefield, six aeroplanes with flyers who were the sergeant's personal friends escorted the body and dropped roses and other flowers from the air on the funeral procession. The procession started from Cornell's Morgue and was placed in a vault at Greenfield Cemetery to await removal to Italy.

The Italian officers present were General Tozzi, chief of the military branch of the Italian mission; Commandant Tritoni representing the Italian Ambassador; Colonels Binda, Pancreti and Bonati; Captain Chippereli; Lieutenants Spinola, Bernati, Vezari, Cantoni and d'Amico. Lieutenant Testoni represented Sergeant Gino's family. Giani Caproni, designer of the Caproni aeroplanes, was represented by Captain d'Annuncio and Lieutenant Belloni.

Major General W. L. Kenly, director of the Bureau of Military Aeronautics of the War Department, was represented by Captain J. S. Fitch. Lieutenant A. L. Clarke appeared for Major C. K. Rhinehardt, commander of Hazelhurst Field.

The pallbearers were Lieutenants H. E. Watson, E. L. Williams and C. B. McCullough, of Hazelhurst Field, students under Sergeant Gino; Lieutenant Ferrand, of the French Instruction Corps; Captain James Watt, Royal Air Force of Great Britain, and Captain Zampagliane Artuso and Lieutenants d'Amico and Cansoni, of the Italian aviation service.

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Manual for Aero Companies, by Satterfield. Price $1.10 postpaid.
Lewis Machine Gun. Price $.65 postpaid.
Mechanical Engineer's Handbook, by Marks. Price $5.30 postpaid.
Aircraft Mechanics Handbook, by Fred H. Colvin. Price $3.25 postpaid.

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> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
>
> **Dated, March 11th, 1918.**

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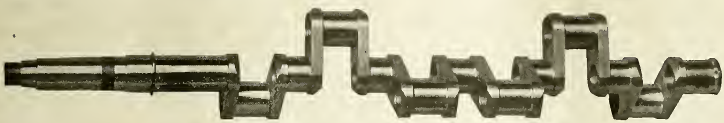

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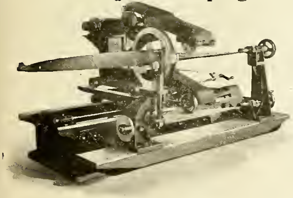

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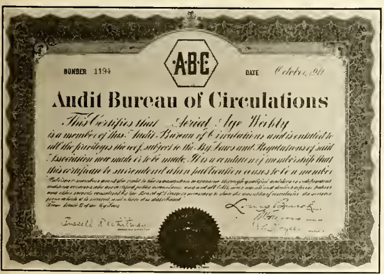

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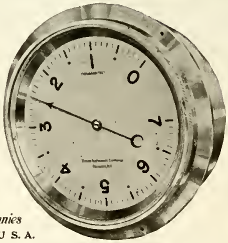

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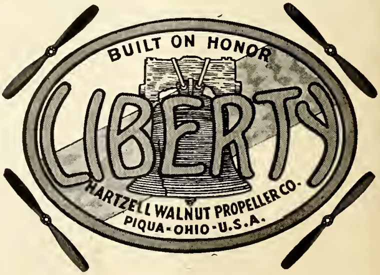
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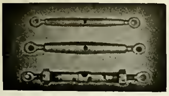

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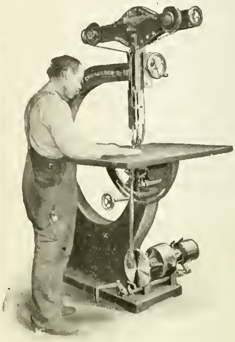

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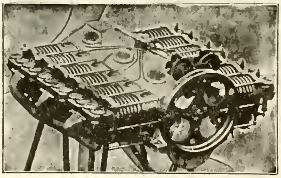

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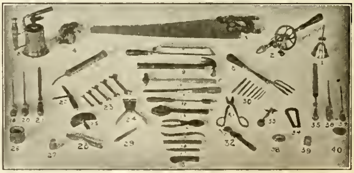

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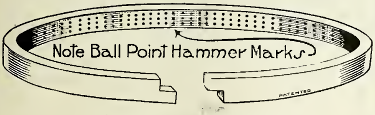
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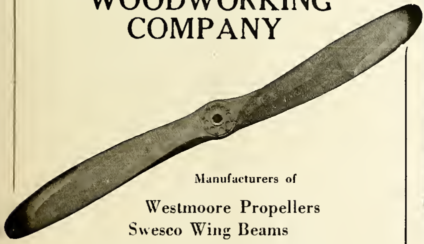

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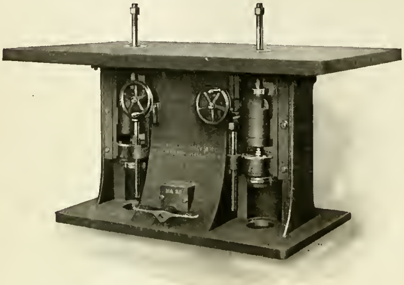

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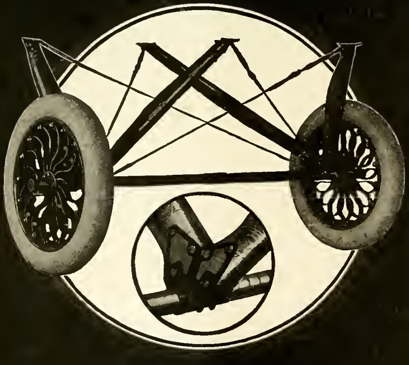

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Vol. 7, No. 22 AUGUST 12, 1918 10 CENTS A COPY

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AERIAL AGE WEEKLY

Vol. VII AUGUST 12, 1918 No. 22

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How I Improved My Memory In One Evening

The Amazing Experience of Victor Jones

"Of *course* I place you! Mr. Addison Sims of Seattle.

"If I remember correctly—and I *do* remember correctly—Mr. Burroughs, the lumberman, introduced me to you at the luncheon of the Seattle Rotary Club three years ago in May. This is a pleasure indeed! I haven't laid eyes on you since that day. How is the grain business? And how did that amalgamation work out?"

The assurance of this speaker—in the crowded corridor of the Hotel McAlpin—compelled me to turn and look at him, though I must say it is not my usual habit to "listen in" even in a hotel lobby.

"He is David M. Roth, the most famous memory expert in the United States," said my friend Kennedy, answering my question before I could get it out. "He will show you a lot more wonderful things than that, before the evening is over."

And he did.

As we went into the banquet room the toastmaster was introducing a long line of the guests to Mr. Roth. I got in line and when it came my turn, Mr. Roth asked, "What are your initials, Mr. Jones, and your business connection and telephone number?" Why he asked this, I learned later, when he picked out from the crowd the 60 men he had met two hours before and called each by name without a mistake. What is more, he named each man's business and telephone number, for good measure.

I won't tell you all the other amazing things this man did except to tell how he called back, without a minute's hesitation, long lists of numbers, bank clearings, prices, lot numbers, parcel post rates and anything else the guests gave him in rapid order.

****

When I met Mr. Roth again—which you may be sure I did the first chance I got—he rather bowled me over by saying, in his quiet, modest way:

"There is nothing miraculous about my remembering anything I want to remember, whether it be names, faces, figures, facts or something I have read in a magazine.

"*You can do this just as easily as I do.* Anyone with an average mind can learn quickly to do exactly the same things which seem so miraculous when I do them.

"My own memory," continued Mr. Roth, "was originally very faulty. Yes it was—a really *poor* memory. On meeting a man I would lose his name in thirty seconds, while now there are probably 10,000 men and women in the United States, many of whom I have met but once, whose names I can call instantly on meeting them."

"That is all right for you, Mr. Roth," I interrupted, "you have given years to it. But how about me?"

"Mr. Jones," he replied, "I can teach you the secret of a good memory in one evening. This is not a guess, because I have done it with thousands of pupils. In the first of seven simple lessons which I have prepared for home study, I show you the basic principle of my whole system and you will find it—not hard work as you might fear—but just like playing a fascinating game. I will prove it to you."

He didn't have to prove it. His Course did: I got it the very next day from his publishers, the Independent Corporation.

When I tackled the first lesson, I suppose I was the most surprised man in forty-eight states to find that I had learned—in about one hour—how to remember a list of one hundred words so that I could call them off forward and back without a single mistake.

That first lesson *stuck*. And so did the other six.

Read this letter from C. Louis Allen, who at 32 years is president of a million dollar corporation, the Pyrene Manufacturing Company of New York, makers of the famous fire extinguisher:

> "Now that the Roth Memory Course is finished, I want to tell you how much I have *enjoyed* the study of this most fascinating subject. Usually these courses involve a great deal of drudgery, but this has been nothing but pure *pleasure* all the way through. I have derived much benefit from taking the course of instructions and feel that I shall continue to strengthen my memory. That is the best part of it. I shall be glad of an opportunity to recommend your work to my friends."

Mr. Allen didn't put it a bit too strong.

The Roth Course is priceless! I can absolutely *count* on my memory now. I can call the name of most any man I have met before—and I am getting better all the time. I can remember any figures I wish to remember. Telephone numbers come to mind instantly, once I have filed them by Mr. Roth's easy method. Street addresses are just as easy.

The old fear of forgetting (you know what that is) has vanished. I used to be "scared stiff" on my feet—because I wasn't *sure*. I couldn't remember what I wanted to say.

Now I am sure of myself, and confident, and "easy as an old shoe" when I get on my feet at the club, or at a banquet, or in a business meeting, or in any social gathering.

Perhaps the most enjoyable part of it all is that I have become a good conversationalist—and I used to be as silent as a sphinx when I got into a crowd of people who knew things.

Now I can call up like a flash of lightning most any fact I want right at the instant I need it most. I used to think a "hair trigger" memory belonged only to the prodigy and genius. Now I see that every man of us has that kind of a memory if he only knows how to make it work right.

I tell you it is a wonderful thing, after groping around in the dark for so many years to be able to switch the big searchlight on your mind and *see* instantly everything you want to remember.

This Roth Course will do wonders in your office.

Since we took it up you never hear anyone in *our* office say "I guess" or "I think it was about so much" or "I forget that right now" or "I can't remember" or "I must look up his name." Now they are right there with the answer—like a shot.

Have you ever heard of "Multigraph" Smith? Real name H. Q. Smith, Division Manager of the Multigraph Sales Company, Ltd., in Montreal. Here is just a bit from a letter of his that I saw last week:

> "Here is the whole thing in a nutshell: Mr. Roth has a most remarkable Memory Course. It is simple, and easy as falling off a log. Yet with one hour a day of practice, anyone—I don't care who he is—can improve his Memory 100% in a week and 1,000% in six months."

My advice to you is don't wait another minute. Send to Independent Corporation for Mr. Roth's amazing course and see what a wonderful memory you have got. Your dividends in *increased earning power* will be enormous.

VICTOR JONES

Send No Money

So confident is the Independent Corporation, the publishers of the Roth Memory Course, that once you have an opportunity to see in your own home how easy it is to double, yes, triple your memory power in a few short hours, that they are willing to send the course on free examination.

Don't send any money. Merely mail the coupon or write a letter and the complete course will be sent, all charges prepaid, at once. If you are not entirely satisfied send it back any time within five days after you receive it and you will owe nothing.

On the other hand, if you are as pleased as are the thousands of other men and women who have used the course send only $5 in full payment. You take no risk and you have everything to gain, so mail the coupon now before this remarkable offer is withdrawn.

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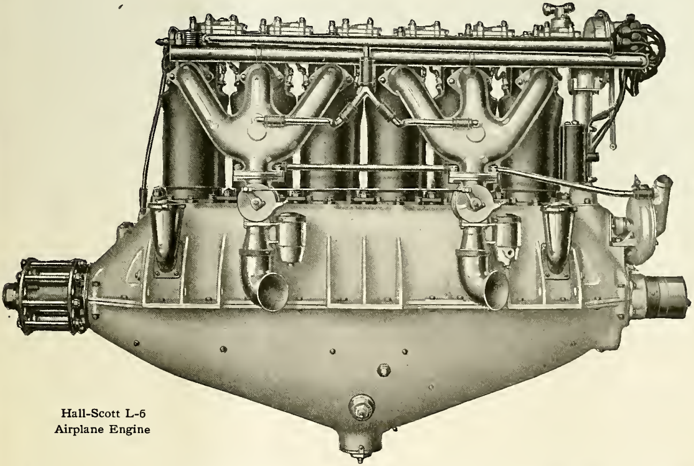

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Airplane Engine

THE L-6, the latest development of the Hall-Scott Motor Car Company, is pictured above. This motor has been designed by Hall-Scott Engineers and produced with a full appreciation that—

A successful automobile motor does not make a successful Airplane Engine and that—

America should and can produce a sturdy, dependable Airplane Engine that would give better service in the hands of American flyers and American mechanics than any of the delicately made equipment of foreign design and construction not adapted to American manufacturing methods.

This type L-5 embodies all of the superior points of the widely known type A-6 and A-5a models, and in addition, the latest features in Airplane Engine practice. This engine has been given thorough running tests under official observation, showing power delivery well in excess of its rated 200 h.p. with a total weight under 500 pounds. Cylinders have a bore of 5 inches and a stroke of 7 inches. Production for one of the Allies has already started.

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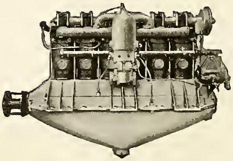

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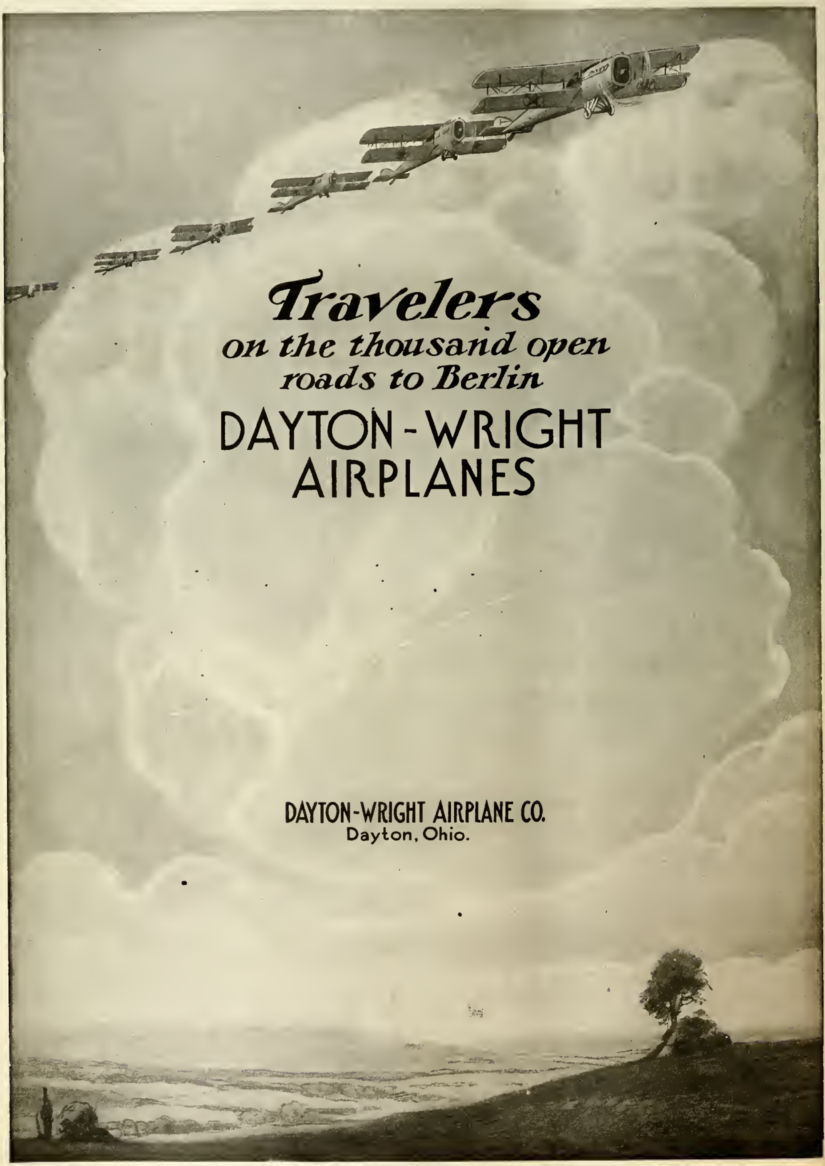

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> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
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> **Dated, March 11th, 1918.**

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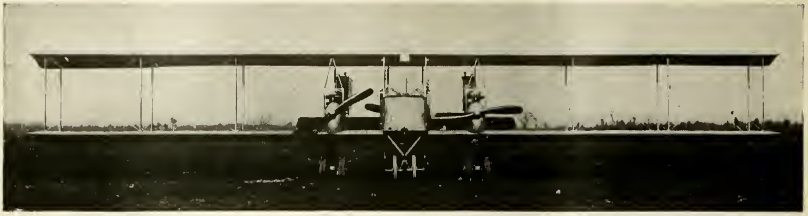

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Vol. VII NEW YORK, AUGUST 12, 1918 No. 22

CLEVELAND AND CHICAGO TO ASK FOR AERIAL MAIL LINE

THE remarkable performances of the Aerial Mail Service during the past two months having shown that the Aerial Mail Service can be run on schedule time rain or shine, efforts are being made to arrange for the extension of the service to other cities.

Cleveland and Chicago are being urged to ask for aerial mail lines and to establish aerodromes to facilitate the work of establishing the Aerial Mail Service.

In letters sent to Colonel Myron T. Herrick, Chairman of the Chamber of Commerce of Cleveland, and to the Secretary of the Chicago Chamber of Commerce, and about fifty prominent people in Cleveland and Chicago, Mr. Henry Woodhouse the Vice-President of the Aerial League of America, wrote as follows:

"My dear Col. Herrick:

"It is not often a city gets an opportunity to get millions of dollars worth of publicity, as well as go down in history as having been a pioneer in an important work—which means getting more millions of dollars worth of advertising in future—by pointing to the fact that said city was a pioneer.

"Cleveland has today a wonderful opportunity of getting millions of dollars worth of national advertising and can become a pioneer by doing something which hereafter Cleveland people will point to as an example of the progressiveness of Cleveland.

"Today Cleveland can have mail delivered by aeroplane provided you ask for it, and we are ready to help you ask for it, and help you get it.

"Up to now the Army has conducted flights between Washington and New York, and these flights, piloted by Army fliers, were looked upon purely as an experimental proposition. It did not require many months to convince the postal authorities that whereas it was demonstrated that fliers could weather all sorts of storms, leave on schedule time and arrive with mail in the shortest possible time known, the aerial mail service is an asset. They immediately made a proposition to take over the entire service, and which, from good information now at hand, is about to take place before the middle of the month.

"Mr. Otto Praeger, Second Assistant Postmaster General, and Capt. Benjamin B. Lipsner, who is Superintendent in Charge of the Division of Aerial Mail Service of the Post Office Department, both remarkable men with extensive vision and tremendous energy, are making plans for the extension of the aerial mail service.

"Now is the time for Cleveland to ask them to include Cleveland in their plans, and as they are anxious to increase the efficiency of mail delivery, and the aeroplane will enable the Post Office to cut down the time of delivery of mail to Cleveland from other cities by many hours, I feel sure that if the Chamber of Commerce asks for an aero mail service, Cleveland will get it and will get it mighty soon.

"Two months of aerial mail service has shown that the men in charge are men who do things quickly and effectively. Provided they see a need for an aerial mail route and they get an offer of co-operation from the Chamber of Commerce, you can rest assured that aeroplanes will be flying to Cleveland a very short time thereafter.

"It is hardly necessary for me to point out that now that we have aeroplanes capable of lifting fifteen tons and going at a speed of about 100 miles per hour, and the Air Service comprises over 10,000 aviators, and the non-flying personnel numbers over 100,000 men, the general application of aircraft for transportation is to come fast.

"Only a few days ago a despatch quoted Mr. John D. Ryan, the energetic Director of Aircraft Production, as saying that there is a type of aeroplane under construction which is to be equipped with four Liberty motors, or 1750 horse power. This air cruiser will probably be capable of lifting close to 40,000 pounds, and the limit in size has by no means been reached. A 5,000 horse power aeroplane may cleave the air before we are a year older.

"Likewise delivery of mail across the Atlantic and across the continent may be as common next year at this time as the delivery of mail by aeroplane on the New York-Philadelphia-Washington route is today. This mail will be much heavier over long distances, because then the aeroplane will make it possible to make deliveries a number of days sooner.

"The fact that the radius of flight of aeroplanes is extending to 2,000 miles, and may extend to 4,000 miles within two years, brings hope for closer understanding between nations after the war, due to faster transportation and intercommunication, but also brings the menace of disaster which may befall to our generation if the control of the air should be gained by a country like Germany.

"As a matter of fact, it is known that Germany is planning extensive aerial mail, express, and passenger transportation lines, to employ the output of her aircraft factories after the war. Germany's plans are extensive enough to employ tens of thousands of large aircraft. This would give her a reserve air fleet large enough to blow England, France or Italy off the map overnight. As was brought out in the House of Commons, by Lord Montague, aircraft can be turned from vehicles of transportation to war machines by the simple process of substituting bombs as cargo. A nation that overlooks this fact may pay dearly for its oversight.

"We all hope, of course, that some agreement may be reached between the nations which will guarantee against such a horror as the bombing of a nation out of existence overnight by another nation having tens of thousands of aeroplanes. But the present war has shown that hope does not save nations from the outrages of aggressors. As a matter of fact, Germany's first air raids on Great Britain were conducted by Zeppelins, which were employed for passenger carrying before the war. So while keeping our hearts in the right place, we must be ready to protect the Republic, and the rights of Humanity and the Cause of Civilization.

"We must, of course, think with both our hearts and our minds when contemplating the reconstruction that will follow the war. We will need both.

"Anything that is done to bring into use thousands of aircraft for civic purposes is a contribution towards placing the United States in the position of the porcupine which goes about its peaceful pursuits, harms no one, but is ever ready to defend itself. The Post Office can use thousands of aeroplanes for the aerial mail service—which will form a valuable reserve for national defense. In assisting the development of the aerial mail service you will be assisting the development of aerial reserves as well.

"You will want to know what are the steps the Chamber of Commerce should take to secure this mail service, so I will define these steps briefly as follows:

"(1) Call a meeting of the Chamber of Commerce, or of your Executive Committee and pass a resolution submitting to the Postal authorities that Cleveland is entitled to aerial mail service, and that Cleveland should be included in the plan for extension of aerial mails.

"(2) Appoint a committee of twenty of your best and most energetic members to consider selecting a place near to the city, or in the city, if possible, suitable for an aerial station. The place ought to be about 1,000 yards square, although it does not matter what shape it is, so long as you have approximately the landing space available in 1,000 square yards. In this respect, I may point out that aerodromes are very much like streets. If you start out by having a narrow street you find later that you have to widen it, and it is difficult to do so. If you start out by making the aerodrome wide enough, you save yourself and the coming generation a great deal of trouble. If a good size aerodrome is selected, then a great many more air lines will be establishd from other cities to Cleveland, because aviators are very much like captains of ships—they prefer to go to ports which afford the best docking facilities. As a matter of fact, the aviator is very much more independent than the captain of a ship, because it only takes a few minutes for him to go to another place thirty or fifty miles away. Therefore, if you want him to come to Cleveland you will have to supply a good aerodrome with suitable facilities to begin with.

"(3) Wthin a few days I will send you a sketch showing what an aerodrome should be in a general way, to facilitate the work of your committee. But I feel sure that as soon as the Chamber of Commerc passes a resolution asking the Post Office to include Cleveland in the aero mail service as a station, you will have the energetic Capt. Lipsner in Cleveland to see what can be done and help your committee to select the field.

"Aerial mail will make it possible to cut down the number of hours in the delivery of mail to every other city in every direction, even though the other cities may not be connected with Cleveland by aerial mail, because the aeroplane will make faster train connections. This will mean a saving of a great many hours or days in the transmission of mail. People in New York and Washington have found that aerial mail permits of saving one or two days in correspondence. For instance, if we receive a letter from Washington in the morning mail, we can answer it and send it to Washington by aeroplane, mailing it at 11 o'clock. It gets there before 3 o'clock in the afternoon, which is early enough to permit them to answer our letter that day.

"In the case of manufacturers of war materials this means that if they receive a request from Washington for anything in the morning mail, they can send it to Washington in the aerial mail that morning and Washingto gets it early eough in the afternoon to send whatever specifications or contracts may be necessary. In other words, two days are saved by the use of the aerial mail, and in cases of war business, the production can actually begin two days earlier because of the aerial mail.

"Cleveland being a manufacturing center, the aerial mail from New York westward would permit saving a great many days in starting the production of war orders.

"The Cleveland newspapers can be counted upon to support the Chamber of Commerce in this request to the Post Office, and, of course you can publish this letter if you think it will assist in creating interest in Cleveland.

"As Postmaster Praeger and Capt. Lipsner are now working on plans, I would urge speedy action so that your request will come before the plans are completed.

"Needless to say, the Aero Club of America and Aerial League of America, and the magazines "Flying" (monthly) and "Aerial Age" (weekly), which have done the pioneer work in fostering the development of the Aerial Mail Service, will be greatly pleased to co-operate with you and the Chamber of Commerce and the people and newspapers of Cleveland in bringing about this development. Please do not hesitate to call upon us whenever we can be of service.

With best wishes, I remain,

Yours very cordially,
(Signed) HENRY WOODHOUSE,
Vice President, Aerial League of America.

This letter was also sent to the Cleveland newspapers and to the following prominent Cleveland people:

Judge W. B. Sanders, Matthew Andrews, C. C. Bolt, B. F. Bourne, F. C. Case, Alvah Chisholm, J. Crider, N. L. Dauby, H. P. Eels, F. Allen Whitting, Elton Hoyt, Julius Feiss, Richard F. Grant, George W. Kinney, Glen L. Martin, Samuel Mather, W. G. Mather, Wm. P. Palmer, S. L. Pierce, E. F. Prentiss, E. W. Bingham, Parmeley Herrick.

SENATORS PROPOSE AIR MINISTRY

SENATORS JAMES A. REED and Harry S. New, of the Senate Committee on Aircraft propose to carry out General Brancker's advice to create an air ministry in the United States as soon as possible.

General William S. Brancker, the Controller General of Equipment for the British Air Ministry, in a statement to the Associated Press before his departure from the United States said:

"It is within the realm of certainty that we can bomb Berlin in the spring, if not in the fall, with aeroplanes we are building, as we have already bombed Cologne and the Rhine cities, but we have not the numbers for a really big offensive in my understanding of the term.

"We have plenty of planes and can build plenty more, but we lack engines and we have about reached the limit of capacity for engine production.

"We have built up a big aeroplane programme to use the Liberty motor and bomb Germany, but America cannot now spare these motors, and so I fear that our aeroplanes will be wasted, and the real offensive from the air will be seriously delayed.

"The delivery of certain types of planes by flying them across the Atlantic is feasible. If we can fly to Berlin and back, which is more than 800 miles, we can fly from Newfoundland to the Azores, the longest gap of the journey, 1,200 miles. This means a big organization, aerodromes and repair plants in Newfoundland and the Azores.

"Your air forces ought to be organized on a tremendous scale, and this is what we look to America to do."

General Brancker urged that the United States Government create a Cabinet position of air controller, who would conduct the department entirely separate from that of the Army and Navy. England has found this necessary.

The Allies now have the ascendency in the air, but they are handicapped by lack of suitable planes that could operate for longer flights over Germany.

He continued:

"We simply had to come to an Air Ministry in England. The Zeppelins and the Gothas, coupled with the experience gained when aviation was controlled by the army and navy, forced it upon us. Public sentiment demanded it.

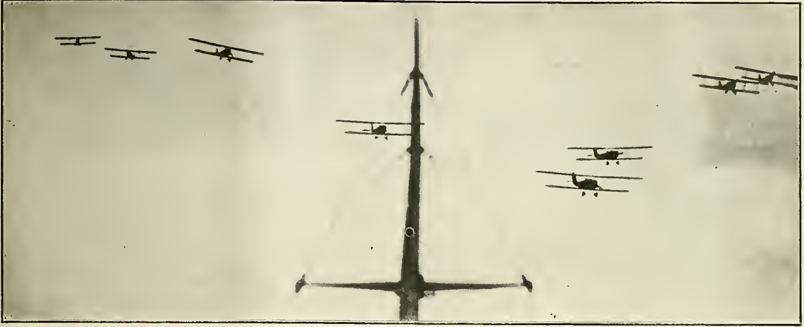
"You have had no air raids in this country to arouse you, but it is my hope that, lacking this stimulus, you will profit by our experience and begin at once on an even basis with us in this matter, instead of waiting for public sentiment to push up from the bottom as in our case.

"Are not the advantages of independent control obvious? Here you have one branch of aviation under the administration of the Secretary of War, another under the Secretary of the Navy. These administrators have many other affairs to attend to. They have subordinates in charge, and there is an Aircraft Production Board, but it is obvious that certain general problems must come before the Secretaries for decision which an official would be much better able to pass upon if aviation were the exclusive function of his office.

"You see we are quite independent. We can formulate policy and strategy, while production, equipment and personnel function under one control. We do not have the anomalous situation of one branch of aviation service competing with the other for production and equipment. Such coordination as this obviously is the only way a great air offensive can be prepared and conducted."

On July 31 Senator Reed came out strongly for the Air Ministry.

On August 1st a definite step looking to the creation of an Air Ministry was taken by Senator Harry S. New, of Indiana, who introduced a bill in the Senate providing for



A flight of American aeroplanes practising formation flying.

such a place in the Cabinet. Under his bill, all aircraft activity of both the army and navy would be placed under one central head, a Secretary of Aeronautics.

The title of the bill is explanatory and reads:

"A bill to create an Executive Department in the Government to be known as the Department of Aeronautics, and for the appointment of a Secretary of Aeronautics and an Assistant Secretary; providing for appropriations for the said department."

The text of the bill follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

"Sec. 1.—That there is hereby created for the period of the present war and for one year thereafter an executive department in the Government of the United States to be known as the Department of Aeronautics, the head of which shall be designated the Secretary of Aeronautics, who shall be appointed by the President and confirmed by the Senate. He shall be a member of the Cabinet and shall receive a salary of $12,000 per year. The Secretary of Aeronautics shall have direct and complete control of all matters pertaining to the designing, purchase, and manufacture and production of aircraft and aircraft equipment intended for the use of the army, the navy, and the Marine Corps of the United States.

"Sec. 2.—The department shall also have an assistant Secretary, who shall be appointed by the President and confirmed by the Senate, who shall receive a salary of $5,000 a year; and such other officers and employes as may be found necessary for the proper and efficient transaction of the business of the department.

"Sec. 3.—The unexpended balance of such appropriations as may have hitherto been made for the purchase and manufacture of aircraft and aircraft equipment and all appropriations which may hereafter be made for such purpose shall be available for the purpose of the department."

Senator New has for some time had the idea of a Secretary of Aeronautics in mind. His intention has been strengthened since the Military Committee's aviation subcommittee has been conducting its investigations.

"I am satisfied," he said today in an interview, "that this bill is the best solution of the aeroplane difficulties. It is based upon conclusions which I have reached as a result of three months of careful investigation of the aircraft situation.

"It is in accord with the opinion expressed by practically all the officers we have examined, as well as of present and former officials of the aircraft managements. Newspapers throughout the country, notably The New York *Times*, have advocated this step, and many public men as well as the experts believe in the plan.

"I do not claim to have originated this idea. England had to come to it long ago. I do not believe that it will ever be possible to bring about the high efficiency necessary to the production of the great number of aeroplanes we need to win the war as long as there is divided authority. There is no getting away from the fact that there is still divided authority in the handling of our aircraft program.

"I have become convinced that it is almost impossible to co-ordinate perfectly two great departments. No matter how hard they may seek to work in harmony, divided authority is always present and must necessarily manifest itself.

"There is only one solution, and that is to have some powerful central authority that would take care of the entire program. Our air battles will be one of the huge factors in the war, and everything must be done to give us the finest, fastest, and best flying machines in the world."

Senator New's bill met with sympathy among several of the twenty or more Senators present, upon this, one of the two days each week when the Senate meets. Senator Sheppard of Texas last year introduced a bill for central control of aircraft production, and he is expected to stand loyally behind the present measure.

AIR DREADNOUGHTS WILL CARRY 100 MEN ON BOMBING OFFENSIVES, CAPRONI SAYS

PARIS, July 29.—"Aeroplanes carrying 100 men and equipment with engines equal in power to those in a medium-sized steamship will be developed within three years," said Gianni Caproni, inventor of the Caproni bombing plane, in an interview today.

"The bombing planes now in use," Signor Caproni continued, "will be mere dwarfs compared with those to be developed. There is a surprise in store for the Germans. Instead of forty and fifty machines necessary to start on a bombing expedition, it will be possible to do the same work with a new machine as powerful as the whole squadron. The new machines will be much more efficacious and will prove a great saving in operation.

"A trip across the Atlantic could be accomplished with the present-day machines during July, August, and September, and probably October. The weather situation would be unfavorable during the other months of the year. Heavy fogs make aerial navigation impossible. Aviators are unable to guide themselves in a fog, as it makes everything black. A trip across the ocean at this time would have to be made by way of New York, the Azores, and Portugal.

"The development of an aerial code similar to the maritime code will be necessary before there can be general aerial navigation. There must be international signals, like those at sea, aerial laws and a whole volume of regulations for aerial transportation.

"The quick development of larger machines is inevitable. At the beginning of the war the largest bombing machine was of 100 horsepower. Now the largest bomber is of 1,000 horsepower.

"The Liberty motor will do. We want them now in large

(*Continued on page* 1083)

THE NEWS OF THE WEEK

Asks Cabinet Seat for Aircraft Head

Washington.—The fight for a Department of Aeronautics was started in the Senate on August 1st when Senator New, Republican, of Indiana, introduced a bill to that end.

The measure provides for an executive department with a Secretary of Aeronautics, to continue for one year after the end of the war, to have "direct and complete control of all matters pertaining to the designing, purchase, manufacture and production of aircraft and aircraft equipment intended for the use of the Army, the Navy and the Marine Corps of the United States." The pay of the Secretary of Aeronautics would be $12,000, and an Assistant Secretary at $5,000 is provided for.

The Senate Aircraft Investigating Committee to-day heard Major Rhinehart, Capt. J. M. Kelly, Capt. C. A. Johnson and Lieut. Frank Wells on the De Haviland and other planes. They were asked about their experience at Dayton, O., and in France. The testimony was given in executive session.

Bristol Aeroplane Scheme Dropped

Washington.—The Bristol aeroplane powered with the Liberty motor is not satisfactory and the building of the combination is about to be abandoned, it has been learned from a trustworthy source.

Until a few days ago army officers had great confidence in the possibilities of this English plane equipped with the Liberty motor. Its distinctive merit was to be great speed and it was to be used for fighting. Preliminary tests were highly encouraging. But in the past two or three weeks three men have been killed in tests and one dangerously injured. The last accident was at Buffalo, when the machine failed at a high altitude and crashed to the earth.

Plans Made on Large Scale

Careful investigation points unmistakably to the fact that the engine was too heavy for the plane, greatly increasing the load and the danger. The inquiries, it is said, have demonstrated that it would be unwise to go ahead with the plans, which had been made on a large scale.

Manufacturing plants have been preparing to go ahead with the building programme immediately. They recently had been put in shape for quantity production. One plant was prepared to turn out the machine in record breaking fashion.

The Government had contracted with the Curtiss Company of Buffalo, it is said, for 3,000 of these machines.

The decision to use the Bristol came after the failure to manufacture the Spad machine. The change, as testified by Major Gen. Squier, Chief Signal Officer, before the House Appropriation Committee April 5, 1918, required forty-five days. Col. Deeds testified that the Bristol could be manufactured easier than the single seated Spad. Full drawing and plans for building the Spad, he said, had been made when orders came from the other side to build the double seaters.

Bigger, More Gun Power

The new machine was to be bigger, with larger equipment and employing greater gun power.

While abandonment of the Bristol programme is a cause of regret, other fighting machines are being made in this country.

The Bristol machine has been tested frequently by the most experienced flyers and is capable, it is said, of developing a speed of 135 miles an hour. The great weight of the engine is too much for the plane construction, and, it is said, the plans will have to be materially readjusted before absolute success is attained.

Mineola-Washington Flight

Under orders to report to headquarters, Division of Military Aeronautics, Washington, Maj. C. K. Rhinehardt, commanding first provisional wing at Mineola, Long Island, made the flight from that field to this city July 31 in two hours and fifteen minutes, the War Department announced.

With him in the plane was Capt. Fred Harvey. The officers alternated in piloting. They left Mineola at 8:35 o'clock and landed at Philadelphia at 9:20. They left Philadelphia at 10 o'clock and reached Washington at 11:30. This is regarded as excellent time considering the rain and mist through which they flew most of the way. In their favor, however, was a northeast wind which stayed with them practically the entire distance.

Call for Men to Help Compile Pictorial History of the War

The War Department authorizes the following statement from the Signal Corps:

The Signal Corps announces an urgent need for a large number of men to engage in the compilation of a pictorial history of the war. About 60 more lieutenants and as many sergeants, first class, are to be selected for this work, and for a short time, until the immediate needs are met, some commissions will be given to men direct from civil life whose erperience is ample to justify this procedure. Other men will be sent temporarily to the Signal Corps School of Photography at Columbia University, New York City, where they will be taught not how to take pictures, but rather what kind of pictures to take. Many of the men commissioned will become staff officers of army divisions, and as such will be in charge of the work of making a pictorial history of the activities of that division from the time of organization through active participation in the conflict.

The successful newspaper photographer represents most nearly the type of man needed—that is to say, he must have a "nose for news" in addition to being able properly to set and expose his camera. A military photographer must possess a generous amount of initiative and originality, for he will have to act as his own boss, his own director, and dig up the type of picture that really tells the story.

The Signal Corps states that appointment will depend almost entirely on the man's previous experience. Application for service can be made and full particulars obtained by addressing the office of the Chief Signal Officer, Photographic Section, Arcade Building, Washington, D. C.

U. S. Aeroplane Carries a Motorcycle

Here's the latest efficiency feature in aircraft production. A motorcycle is standard equipment on this reconnaissance machine, its object being for use where a landing is made on the outskirts of a city or in the country. Heretofore the aviator had either to telephone for help or trust that a passing automobile would take him into a town or station. This idea was originated by Glenn Martin, aviator and aeroplane builder for the United States Government.

Aviators Fly from Paris to St. Nazaire and Back

Paris.—Two aviators are reported to have made a flight from Paris to St. Nazaire and return in five hours and fifty minutes. This time included a stop of three-quarters of an hour at St. Nazaire. The distance during the round trip was about 475 miles.

Our Captured Fliers Well

GENEVA, Switzerland. — Communications have been received here by the Red Cross from ten American aviators who were taken prisoner during recent aerial raids by American squadrons on towns along the Rhine River. All the aviators are in excellent health. They have been interned at Baden and Rastatt. The names of the pilots and the details of their capture have been forwarded to Washington.

Aviation cadets on their last route march before graduating from the school which they were attending. Each squadron adopts an insignia. This insignia is seen on their regimental color shown alongside the national colors. (Committee on Public Information)

Rantoul and Chanute Field Entertained 9,000 People July 4th

The first patriotic community celebration of Rantoul and Chanute Field was pulled off with marked success at the west end of Chanute Field, on July 4th, before a crowd estimated at between eight and nine thousand. The celebration consisted of a monster parade to the field, followed by a track meet, a ball game, exhibition flying. Beginning again after supper there was a band concert, wrestling and boxing staged on a large platform built in the center of the main street in Rantoul.

The parade, under the direction of Marshals Walker and Ehlert, of the post hospital, formed in the business center of town, marched through the business district and thence to the field. They arrived at the field a short time after one o'clock, and the band gave an excellent concert.

Through the courtesy of Major Krapf, a number of planes were on the field for inspection by the crowd, many of whom had never seen one but at a distance. They did some fine formation flying and then began doing all kinds of hair-raising stunts. Side slips, tail spins, loops, nose dives, stalls and everything in the stunt line was pulled off for the benefit of the onlookers. This lasted until 5:30 when the events at the field were brought to a close.

Flying instructors at these fields have the work divided as follows at present: Lieut. Slattery is in charge of the dual instruction; Lieut. Cupp has the acrobatic flying, and Lieut. Bandy is in charge of the solo flying. Lieutenant Kritzer is in charge of the formation flying and Lieuts. Ahney and Ritchie have the cross-country work. Each of these men are expert flyers and understand the game all the way through.

Chanute Field to Have Soldiers' Club House

The contract has been let for the building of a new Soldiers' club house at Chanute Field. Mayor Smith and the other members of the board of civilians consisting of W. A. Molloy and James F. Clark, visited the field and conferred with the board of officers consisting of Major Lorin C. Collins, Lieut. Winner and Lieut. McCormick. The building when completed will cost in the neighborhood of $5,000. It will face the south; will be 80x40 feet and will have a porch 10 feet deep running across the south end. It will be fitted up as a regular club house for the enlisted men of the field, and will fill a long felt want for the men have nothing to do when they go to town but hang around on the streets.

Tales from Taliaferro Field

Major George E. A. Reinburg, commanding officer, has announced the appointment of Major Thorne Deuel, lately executive officer at Kelly Field, as commandant of the School of Aerial Gunnery at this post. Maj. Deuel will have as his assistant Capt. Howard F. Wehrle who has been acting commandant for some time. Many improvements are being considered for this, the oldest and largest gunnery school in the country.

The first of the big shipment of new Thomas Morse scout planes has arrived at Taliaferro Field and the hum of their motors will soon be heard over the big 11,700 acre tract used as a gunnery range.

Eighty enlisted men, who have passed the preliminary mental and physical examinations at this field, have been appearing before an aviation examining board in Fort Worth this week and then taking their flying physical examinations. The successful candidates will be sent to schools of military aeronautics for training leading to commissions as flying officers. This is the first batch of candidates under the new policy opening the flying service only to enlisted men.

Thrilling Aerial "Combat" Held at Ellington Field

Using practically every turn, slide and stunt known in aviation, Major McDonnell and Lieutenant Baird, aerial acrobatic instructor at Ellington Field, staged one of the most thrilling "combats" that has been witnessed at the field in some time, on July 8th.

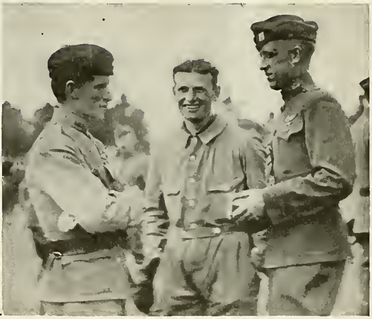
Necks craned out of every window in the barracks, and men on duty ceased their labors to watch these premier flyers endeavor to get on each other's tail.

Both officers went into spin after spin. First one would get in position for what could have easily been a deadly shot, when he was shaken off by a loop, spiral, side slip or spin.

Lieutenant Baird in several instances flew on his back. In this, it is safe to say that he surpasses perhaps any flyer in the United States using training machines.

The work of both officers brought cries of admiration from the hundreds of witnesses on the ground.

The "combat" lasted for nearly a half hour, during which time every minute provided a thrill. At times the duel was fought as low as 100 feet. First one would shoot almost vertically toward the clouds, only to be followed by the other. Then spin after spin followed.



This photograph taken during the christening of the first American-built battleplane in France, shows among others Captain K. G. Pullian, Jr., U. S. Army, Commanding Field No. 3. (Photograph Bureau of Public Information.)

Plane Hit Homing Pigeons

One of the planes from Chanute Field hit a flock of trained homers a short time ago and killed seven of them. The flier could not miss them, as they flew right in front of his machine.

Captain J. F. Morris, M.C.C.deG. of the British Royal Air Force, who has brought down twenty-nine German planes and is now in this country

Eddie Flies Home to Get Telegram From His Sister

Eddie Stinson flew home from Kelly Field on a visit to his folks.

Mrs. Stinson, who runs a farm on Alamo Heights, San Antonio, notified him that his sister, Katherine, the famous aviatrix, had sent him a wire.

Knowing Eddie would come home in a hurry to get the message, his mother expected him to motor over. But there was no sign of Eddie's auto.

It was his younger brother who spied him.

"There comes Eddie," he said, pointing to the sky. It was Eddie in his "Humming Bird," the small single seater scout. Spiraling around looking for a suitable landing, he finally alighted on Johnson's farm nearby. Then almost everybody came down to see Eddie, who is popular with the neighbors.—Kelly Field *Eagle*.

Cadets Build Ships in Which They will Fly

"The cadet builds the ship in which he must later fly," sums up the new system inaugurated by Lieut. Armand V. E. Smith, officr in charge of instruction in aeroplane construction at the Cadet Wing. The method, it is believed, is used only at Kelly Field.

Lieut. Smith in explaining the innovation said:

"In the ground schools, the cadets are taught to tear down and put together aeroplanes which never leave the hangar for the air. This is excellent instruction but when the cadets arrive at the flying school it is necessary to give 12 hours more in construction work.

"They have already learned about all they will learn of aeroplane construction unless they are given a different and totally new course of training," Lieut. Smith explained. "All men, and especially cadets, are always looking for something new.

"In this school they enter the different shops and gather up the parts of the aeroplanes. They take them to the hangar and there, under the critical eye of skilled instructors, they put the machine together. Knowing that they are to fly in it when it is completed, they are naturally vitally concerned over every particle of work done.

"An instructor does not utter a word of advice or criticism that the cadets do not heed because their lives are at stake. Carelessness might mean that the first man who went up in the ship would be killed."

The aeroplanes put together by the cadets are thoroughly tested by experts before the cadets take them up, and whenever an error in construction is found the cadets who put the machine together are shown what might have happened to one of their number had not the error been detected in time.

The object of the whole course, Lieut. Smith explained, is to make the cadets so thoroughly acquainted with aeroplane construction that they can inspect their machines before they take them up and also so thoroughly acquaint the flyers with the function of every stick and piece of metal that in case of a forced landing because of trouble, a broken rib, a torn wing or even things more serious, they will be able to crudely repair the damage well enough so their machine will take them home.

Actual construction of the wings and fuselage are the only features of aeroplane construction that the cadets are not now taking up under Lieut. Smith's plan of teaching. It is planned to make this feature of the work a part of the course as soon as possible.

Concerning Overseas Equipment

Baggage of officers below the grade of brigadier general, ordered to duty in France with the American Expeditionary forces, will be limited to one bedding roll, one locker, or its equivalent, and one piece of hand baggage. Horse equipment, when taken by mounted officers, will be allowed in addition.

No Canvas Leggins Worn Abroad

An order issued by the War Department relative to squadrons about to leave for overseas duty specifically states that every man leaving for abroad shall be furnished with spiral puttees and that canvas leggins must not be worn.

And on top of this comes the information that campaign hats are tabooed for winter wear. In their place those natty, saucy aviator-like caps will be worn, and just think, it's winterish over there mostly all the time. The soldiers in turn are wearing their web waist pack belt stripped of all its appurtenances.

French Ace Fonck's Official Total Now 56

Lieutenant Rene Fonck, one of the leading French aces, brought down two German aeroplanes on July 16, two on July 18, and three on July 19. Six of these machines were brought down in flames. Fonck's total is now officially fifty-six machines.

Air Service Military Aeronautics Division

The transfer from the Aviation Section of the Signal Corps to the Air Service Department of Military Aeronautics Division of the numerous officers whose definite status places them in the Aviation Section of the Air Service proper, and officers attached to the Production Department of the Department of Military Aeronautics, is being rapidly consummated.

250 Miles an Hour Is Possible in Air

London.—"It would be easy for any British aeroplane manufacturer to produce a machine which could make better than 250 miles an hour," declared Capt. W. G. Aston, one of the leading English experts on air mechanics. "This could be accomplished by merely altering the curvature of the planes. But this would mean a minimum landing speed of about 150 miles an hour, and there is the great difficulty.

"The machine would be unquestionably flyable, but its successful landing would require an aerodrome five or six miles long to say nothing of extraordinary skill on the part of the pilot."

Hempstead Field Now Mitchel Field

In honor of Major Mitchel and three other American aviators who have given their lives for their country, four Long Island aviation fields were renamed for them on July 24th. This honor was conferred upon the dead heroes at the suggestion of Major C. K. Rhinehardt, in command of the Long Island Provisional Flying Wing.

Field No. 2 at Hempstead will be known as Mitchel Field; Field Wantagh will be called Lufbery Field, in honor of Major Raoul Lufbery, the ace, who recently was killed in an air duel in France.

The field at Comac has been changed to Chapman Field, honoring C. G. Chapman, killed in France, and the field at Babylon will hereafter be known as the Henry J. Damm Field, for the aviator who was killed in action in May.

Airman Drop Supplies for Battalion in Peril

With the French Army—A French battalion was surrounded July 7 in the region of Lourcy and it was decided to revictual the beleaguered troops by aeroplanes. Some hours later more than 200 loaves of bread, quantities of biscuit and more than 250 tins of conserved meat were dropped by the airmen to the famished poilus.

On the following day a message came that the besieged troops were plentifully supplied with food, but lacked ammunition. Aviators again flew over them and dropped supplies of cartridges. Well fed and well ammunitioned, the Frenchman held the Germans at bay. They counter-charged brilliantly and held out until relief arrived on the night of the 8th.

Mexican Editors Fly at Kelly Field

'The flying exhibition at Kelly Field was wonderful," said Leo D. Walker, director of "El "Progreso," Monterey, Mexico. As leader of the party of Mexican newspapermen who visited Kelly Field July 12, on their way back to Mexico after touring the United States from coast to coast, he acted as spokesman.

Although Kelly Field was not the first aviation camp they had stopped at, it was there they had their first chance to see stunt and formation flying, staged in their honor.

"We never saw anything like it before," explained Senor Walker. "We certainly will tell the Mexicans what wonderful fliers you have here."

Musical Director Announces Plans

Langley Field, Va.—Private J. E. Carroll, musical director of the post has announced his plans of music for Langley Field that will include the following organizations: (1) A full military band; (2) orchestra; (3) choral singing; (4) quartette singing. A contest embracing the singing units of the various squadrons of the field will be arranged, to determine the personnel of the vocal organizations and sometime in the latter part of August will be given a combined orchestra and choral concert.

New System for Salvaging Wrecked Planes

Kelly Field, Texas.—A new system of operation of the wrecking department, Kelly Field Flying Department, designed to reduce by half the number of wrecked aeroplanes sent into the shops for general repairs, has been inaugurated by Lieutenant John M. Loeblein.

Following the fall of a machine or its damage in other ways, the pilot will immediately notify the wrecking department, providing he himself is uninjured, stating whether the damage can be repaired by dispatching new parts. If the aviator himself is injured, this report on the condition of the machine is made by the aviator who finds it.

If the machine can be made ready for flight by the use of one or more new parts and the location is such that a pilot can take them off, the required new parts are dispatched from the wrecking department with skilled mechanics to make the repairs.

If the ship is too badly demaged to be repaired outside the shops, the wrecking crew is sent out to dismantle it and bring it in, provided it is not more than 100 miles distant from Kelly Field.

If the machine falls more than 100 miles away, new parts are sent by express and mechanics sent by train to repair it, if field repairs are possible. If the damage is too serious for such repair, men are sent by train to dismantle the ship and return it to the field by express.

The elimination of unnecessary dismantling of ships and hauling over long-rough roads in motor trucks is the object of the new system. The jostling and jolting received in being hauled long distance by motor truck make it necessary to put a ship in the shops when the original damage might have been repaired quickly and easily.

The wrecking department is now in charge of Lieut. O. L. Weidmann.

American Flying Fatalities Fewest

Washington.—A statement issued by the War Department on August 4 sets up the claim that a new minimum record for losses sustained in training flights has been established in American aviation training camps.

"The figures relating to the safeguarding of cadets of the new army training for duty overseas as pilots and observers," says the announcement, "are now on a par with, if not actually lower than, the percentage figures of this nation's allies and are believed to be much under the figures of the Central Powers.

"United States schools, in attaining the present rating, have proceeded on the theory that three out of four deaths in flying at the front have been due to lack of judgment and that but one man out of four has been killed in action; further, that if a cadet were given all of his instruction in the flying schools in the United States he would put all of his air training out of mind when he finally reached the front and concentrate entirely on fighting. Because of the fact that he had been perfectly trained as a 'stunt' flier, it is said, he would be the more able to pick up his fighting tactics quickly.

"Official records show that from September 1, 1917 to and including July 20, 1918, the losses sustained in the actual flying training of United States air forces in this country by American units totaled 155, which for each four of actual flying training was .000305. In other words, the

(*Continued on page* 1074)

Each morning before proceeding with the work of the day each squadron at our aviation camps holds a formal parade as seen above. At this parade orders are read which effect the squadron. (Committee on Public Information)

The AIRCRAFT TRADE REVIEW

Aeroplane Spruce Brigade

Ten thousand soldiers of the National Army, working like beavers with an army of civilians in the Puget Sound woods, are now getting out aeroplane spruce at the rate of twenty million feet a month. This is a victory—equal in importance to a successful drive on the battlefield—due to the genius of Colonel Brice P. Disque, of the spruce production division of the aviation section of the Signal Corps.

Several months ago, when Disque tackled the task, industrial war was being waged between the lumbermen and their employees. The I.W.W. were making the most of it. Disque immediately reformed the conditions which were making rebels out of more than 50,000 loggers and millmen. He established the eight-hour day and decent housing and board. He organized the Loyal Legion of Loggers and Lumbermen, and in a short time 80,000 workers in the states of Oregon and Washington had taken the pledge of loyalty to their country and to their employers. He commandeered thousands of soldiers best fitted for forest work, in the various cantonments, to serve with the civilians on the regular civilian's pay. Spruce production leaped from two million to ten million feet a month, and now the Government is assured of twenty million feet a month—lumber perfectly straight in grain, free from knots, checks and blemishes.

Discipline in the woods is ideal. The soldiers' example in loyalty, energy, cleanliness and enthusiasm quickly was emulated by the civilians. All are early to bed, early to rise. Each day is a tournament of achievement. The soldiers "hang their idle armor upon the wall" in the forest barracks and "fight" eight hours a day side by side with their civilian brothers.—Charles Philip Norton in *Leslie's*.

Castor Bean Crop Aids U. S. Aeroplane War Aim

Austin, Tex.—It is shown by a survey that has just been made of the castor bean crop in Texas by representatives of the United States Department of Agriculture that there are more than 13,000 acres in cultivation and that a good yield of the beans is promised.

In the more southern part of the State harvesting the crop will be started soon. The Government will take over the entire production of motor oil produced from the beans. The success that has been met in growing castor beans in this State shows that the soil and climate are splendidly adapted to the new industry, the Government experts say, and there promises to be a big increase in the acreage next year.

With the development of the aeroplane for war use and as a means of general aerial transportation after the war, demand for castor oil as a lubricant for the machines will continue to grow, it is stated. For high altitude flying no other kind of lubricant fills the bill as well as castor oil, according to the tests that have been made.

Frank L. Wurl Appointed Remy Sales Engineer

Frank L. Wurl, who has been intimately connected with many new developments in automotive ignition, starting and lighting, has been promoted sales engineer of the Remy Electric Company, located at Detroit.

Mr. Wurl came to the Remy Company a few years ago as electrical engineer, but his marked ability soon placed him at the head of the research laboratories, where he has directed many moves in the constant improving of Remy equipment.

Mr. Wurl has already taken up his new duties of Sales Engineer, and his friends, both inside and outside the industry, are expressing their joy and satisfaction over the promotion.

Sends 1,000 Words a Minute

Washington.—"Telepost," a new device said to be capable of sending 1,000 words a minute over a single wire, was described by the inventor, Charles H. Selliman, at a meeting of the American Inventors' Association in the rooms of the Board of Trade on August 2. Mr. Selliman, it is understood, is in Washington to lay the device before the Post Office Department. It is claimed that "Telepost" is immune from wire-tapping.

The secretary of the association read a letter from Dr. F. W. Buck, president of the Buck Aircraft and Munitions Company, of Pueblo, Col., in which he announced that he expected to make a trial flight of his new metal aeroplane at Pueblo shortly. Colonel Samuel E. Adair of Brazil was admitted to membership. F. J. Hemen of Seattle, Wash., presided.

Storage Batteries for Aircraft

The extensive employment of electrical apparatus aboard the fighting aeroplane calls for some suitable source of power, and more and more aeronautical engineers are turning to the automobile practice of storage battery and generator and away from the European idea of a magneto. Battery current is required not only for ignition, but also for engine starting, night signaling, radio telegraphy, and photography. After many months of experimenting Mr. N. D. Sturges of New York City has produced a lightweight storage battery which meets the rigid requirements of the aeroplane designers. In order to accomplish his purpose he has had to manufacture very light lead grids and at the same time make them of sufficient strength to hold the active material without buckling, despite constant vibration. A special die had to be invented to allow the casting of unprecedented thinness. The results have been a battery of exceptional merit, and incidentally the lightest battery ever manufactured for watt hours per pound of elements. The battery is capable of a steady current of 20 watt hours per pound of elements, which is claimed to exceed any other battery; and it is only half as heavy as the average automobile starting battery, which weighs about 80 pounds. The overall dimensions of the aeroplane battery are: Length 9⅜ inches; width 6½ inches; height, 8¼ inches. The plates are 1/16 inch in thickness, nine to a cell, and six cells to a battery, or a total of 54 plates. The battery has an output of 50 amperes at 12 volts for 30 minutes.

M. A. M. A. Would Support Aeroplane Show

New York.—At the quarterly board meeting of the Motor and Accessory Manufacturers Association it was decided that this body will support an aeroplane show if such is permitted to be held by the War Department. The show committee of the association was instructed to make its usual contracts with the National Automobile Chamber of Commerce covering both the New York and Chicago shows.

E. W. Beach has resigned as a member of the executive committee because of his affiliation with the Bureau of Aircraft Production in Washington but will remain a member of the Board of Directors. His place on the excutive committee will be taken by William M. Sweet.

One new member, the Sewell Cushion Wheel Company, Detroit, was elected to membership.

Tuning the wires—trueing the aeroplane

Spruce Lumber Price Up

Washington.—Increases averaging approximately $4 a thousand feet for New England spruce lumber were authorized on July 26 by the price fixing committee of the War Industries Board for the period from July 19 to November 1, 1918.

Personal Par

Finley R. Porter is now aeroplane engineer in charge of engine development. He was formerly chief engineer of the Mercer Motor Car Co. and afterwards designer of the F. R. P. cars at Port Jefferson, L. I.

A very delicate step in the manufacture of an aeroplane. Tuning up the flying wires. A wing which is ever so little out of alignment would make the machine very unstable

MILITARY AEROSTATICS

By Lieut. H. K. Black, R. F. C., C. F. A.

THE Cacquot Observation balloon is generally made of rubberized silk. I believe that there have been tests made lately with rubberized cotton. Just what the result of the tests have been I do not know. My personal opinion is that the cotton ought to be alright, though no doubt it is a bit heavier than the silk. Latter day balloons are considerably heavier than they used to be anyway. The stress of service and the rought times they are bound to encounter in France today necessitates a stouter material than used to be thought necessary.

In manufacture the fabric is cemented together. There are at least two piles of fabric in the ordinary balloon. In places there are three. The foregoing refers to the gas holding envelope. The rudder and the interior balloonet is generally only one ply thick. Where two or three ply material is used, the plies are cemented on the bias, thus gaining enormously in resistance to tears. As a matter of fact it is almost impossible to tear three ply balloon fabric with one's hands.

Almost without exception the panel system of manufacture is adopted in observation balloons, that is, rectangular panels of fabric are cemented and sewn together in the same form as bricks are laid. The balloon is somewhat less than ninety feet long from bow to stern and slightly less than thirty feet wide at the widest part. The greatest beam, to speak nautically, is about one third of the length from the bow to the stern. From here it tapers off somewhat toward the stern, thereby gaining a streamline effect.

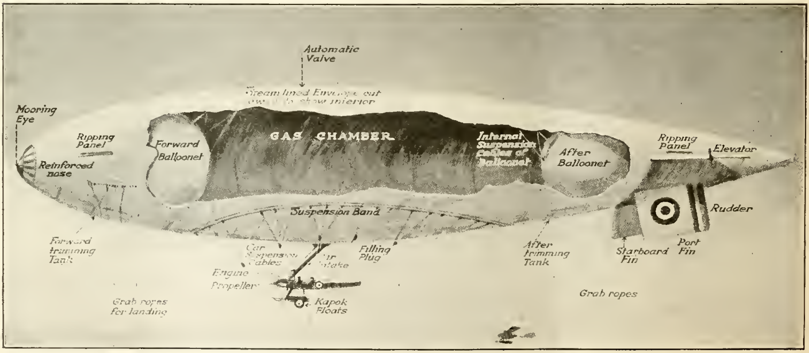
Outside the envelope, toward the stern, and underneath, is the rudder. This is a sausage-like arrangement which runs toward the stern and ends in two small pipes which communicate with the fins. The fins are approximately the shape of the rudder. They are placed toward the stern of the balloon somewhat above the equator. They used to be closed at the forward end but it was found that a small aperture added to the steadiness of the balloon so in the later types there was left a small hole about an inch in diameter. There are two sleeves for deflating the fins quickly which are always tied tightly when the balloon is in flight.

The fins are the chief things which keep the balloon steady. As a chain is as strong as its weakest link, so is an observation balloon as steady as its fins. The way the fins on some balloons behave would almost make one believe it a matter of temperament. If they are steady on its first flight the balloon will be a steady one. If the fins wobble on the first flight, nothing on earth will make that balloon a steady one. Such a wobbly balloon drags out its more or less short existence on the front thoroughly hated and cursed by its observers.

The fins and rudder lie flat to the envelope when the balloon is not in the air. On ascent, the wind blows into the rudder through a wind scoop, inflates it and passing up through the two small pipes, inflates the fins in turn. The time it takes to inflate them depends entirely on the strength of the wind.

The balloon is not as popular opinion seems to imagine, entirely filled with gas. Because gas expands and contracts very much according to atmospheric conditions, some means must be adopted so that the shape of the balloon will remain the same all the time. In other words, the internal pressure must remain constant. To accomplish this a balloonet filled with air was adopted. The balloonet occupies less than one third of the space inside the balloon. It runs diagonally from end to end from the lower surface at the bow to near the upper surface at the stern. It is made of single ply balloon fabric and is rather loose. It has an opening leading to the interior of the rudder. When the wind blows into the rudder it flows through into the balloonet. Not being able to escape, it is put under pressure of the wind entering the rudder. This raises the single ply balloonet until the pressure of the air in the balloonet is equal to the pressure of the gas contained in the balloon. As the gas expands under atmospheric changes it forces the balloonet down and drives some of the air in the rudder out. As the gas contracts, more air is allowed in the rudder and the balloonet forced up. Thus the interior of the balloon is kept at the same pressure at all times, under all atmospheric conditions. This being so the shape of the balloon is maintained, a very necessary thing, for upon the constant shape of the balloon depends its ability to fly correctly and safely. The action of the automatic valve holds a very close relation to this, and its action and description will appear in an early issue.

(To be continued)



A Blimp or Dirigible Airship shown in section. It shows the system of rigging. The Blimp is streamlined to offer as little resistance to the air as possible. The gas chamber is shown and the two balloonets, one at each end, which automatically equalize the internal pressure which makes the balloon keep its shape while flying

THE GERMAN H. W. BIPLANE

THE most interesting feature of the Hannover biplane, apart from the biplane tail which first drew attention to the machine, is the unusually deep body. Without having actually measured the depth of the body we should judge its maximum depth to be in the neighborhood of five feet. The reason for choosing such a deep body, the cross sectional area of which is great and must, it would appear, necessarily have a fairly high resistance, is somewhat difficult to follow unless it be assumed that the object has been to bring the heads of the occupants almost in line with a continuation of the chord line of the upper plane, thus giving pilot as well as gunnner a practically unobstructed view in a forward and upward direction. Whether or not this has been the cause cannot be definitely stated, but it would certainly appear to have had that effect. As if to further ensure that the gunner was free to look forward in line with the top plane, his gun ring is mounted in a form of turret, elevated some distance above the main top of the body. It is possible that the gunner has been able to increase his arc of fire beyond that usually coming within the providence of the crew of the rear gun, and fire forward between the planes. This would be possible on account of the fact that there is only one pair of interplane struts on each side of the body, the lift cables therefore running out at a rather flatter angle than is usual in a machine of this size. There would, of course, always be the danger of hitting a lift wire, unless a stop were provided preventing the gun from being fired when in line with a wire. Of this there does not appar to be any sign, and it is possible that the designer trusts to the gunner to refrain from firing while the muzzle of the gun is too close to a wire. That this little detail might easily be overlooked in the excitement of a scrap seems probable, but perhaps the German attitude towards this particular subject is the same as that expressed to us some time ago by a French friend while discussing this same feature. Our friend expressed himself as follows: "Well, suppose you do hit one of your own wires. You come down. *C'est la guerre.*" However, most pilots would probably prefer to leave the pinging of his wires to the other chap.

Constructionally the body of the Hannover biplane is that now so frequently found on German machines, a light framework covered with three-ply. In section, however, the body is somewhat unusual, in that at the point of maximum depth it has flat sides and bottom, with a curved deck, while near the nose, the section is nearly circular and the tail portion is oval in section, not unlike the tail of a fish. This seems rather the reverse of usual practice.

In the gunner's cockpit there is the usual hinged seat which can be swung back out of the way when the gunner wishes to fire from a standing position. On the port wall of the body there is a wood drum around which the aerial is wound, passing through a wide tube fitting in holes in the bottom of the body. Centrally placed, in front of the gunner's feet, is a framework of steel, mounted so as to pivot around a transverse horizontal axis, and telescopically sprung by two short lengths of tubes and coil springs, which appears to have been used for releasing the bombs. Immediately under this framework there is a sliding trap door in the floor, which reveals, when removed, another compartment underneath the floor boards, between them and the bottom of the body. It is, in fact, a sort of cellar, and a humorously minded visitor suggested that this was where the gunner kept his *lager*, but closer inspection revealed the fact that in this compartment, and immediately underneath the other, was another sliding trap door, operated by a rather clumsy arrangement of cables and pulleys, surrounded by a rail some eight inches high. When both doors are open the way is clear for the bomb to drop. The bombs were apparently carried in racks on the floor to the right of the release gear, while on the left a number of fittings appear to indicate that here was at one time mounted the wireless set. On the starboard wall of the body is a lever marked Kupplung (Clutch), which has probably been used for throwing the wireless into and out of gear. On the starboard wall are also a couple of electric connections of the wall plug type, used, evidently, for connecting up the gunner's electrically heated suit with the generator circuit. No gun was mounted on the machine we examined, but the gun ring and pivot were of the usual type.

In the pilot's cockpit there were the usual instruments on a dash, and in addition a couple of inclinometers of somewhat unusual type, one for indicating lateral inclination, mounted on the dash, and another for longitudinal angularity mounted on the starboard side of the cockpit. These inclinometers appeared to consist of an upper semicircle painted blue, which was fixed, and a lower semicircle, red in colour, which always remained horizontal. In appearance, the lower semicircle was like a piece of ruby glass, but probably a closer inspection would prove it to be a liquid contained in a semicircular container.

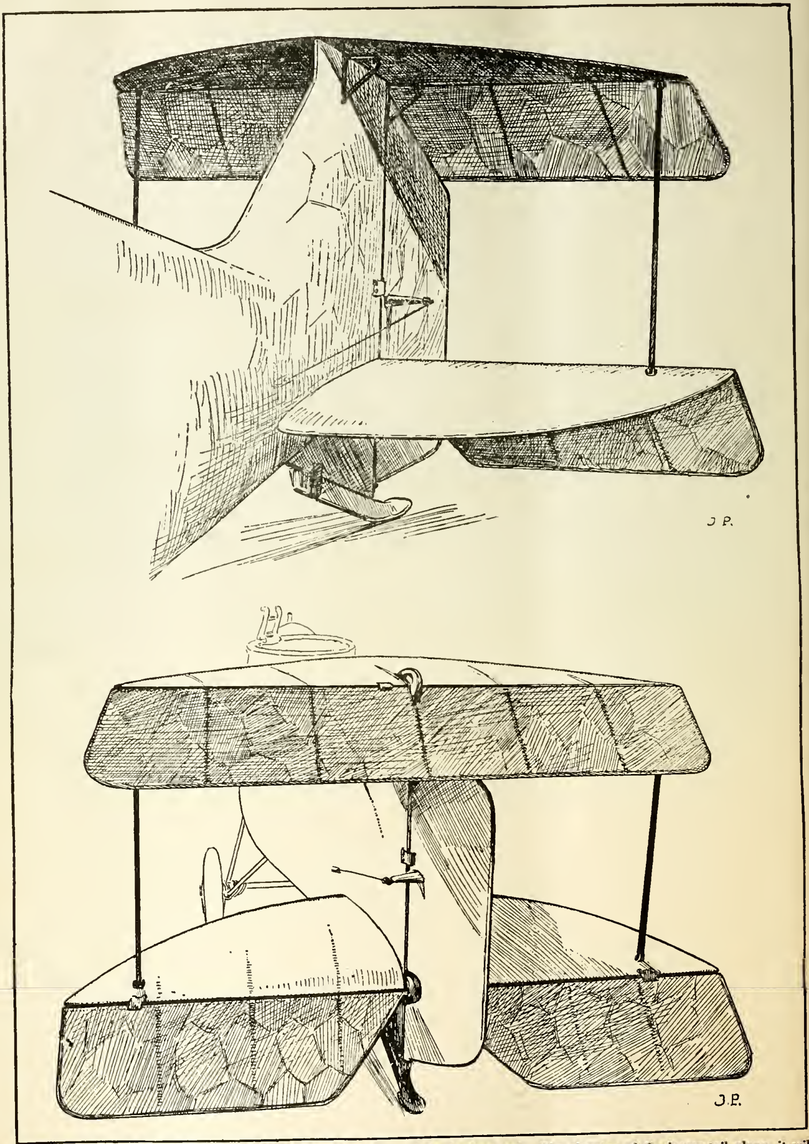
The controls did not present anything of especial interest. The control column terminated at the top in a double handle, the two parts of which sloped slightly downwards. On this was mounted the trigger for the machine gun, of which only one appears to have been fitted for use by the pilot. The seat was mounted on top of the main petrol tank, a large cylinder placed transversely on the floor of the cockpit. At the pilot's right hand was a hand operated pressure pump, which had a rearward extension enabling it to be worked by the gunner at will. A stamp on the wall of the cockpit gave an indication of the date of manufacture. The stamp read ZAK—which apparently corresponds to our A.I.D.—6/12/17.

Although not in place on the machine we inspected, the wings were available for examination and showed that the span of upper and lower wings was approximately equal. The chord of the upper plane was considerably greater than that of the lower. There was only one pair of interplane struts on each side in spite of the considerable span of the machine, and the top plane had a centre section mounted on two pairs of N's sloping out slightly. The tips of the top plane were raked, and the wing flaps balanced and warped. The lower planes, on the other hand, had rounded tips of the shape commonly known as Bleriot tips from their similarity to the wing tips of that well-known designer's early monoplanes. In the middle of the centre section of the top plane the trailing edge had been cut away, and between the spars were mounted, on the port side the petrol service tank, and on the starboard side the radiator. The latter was partly covered by a semicircular shutter which could be rotated out of the way to give increased cooling. The amount of variation in cooling thus obtainable appeared, however, to be very small.

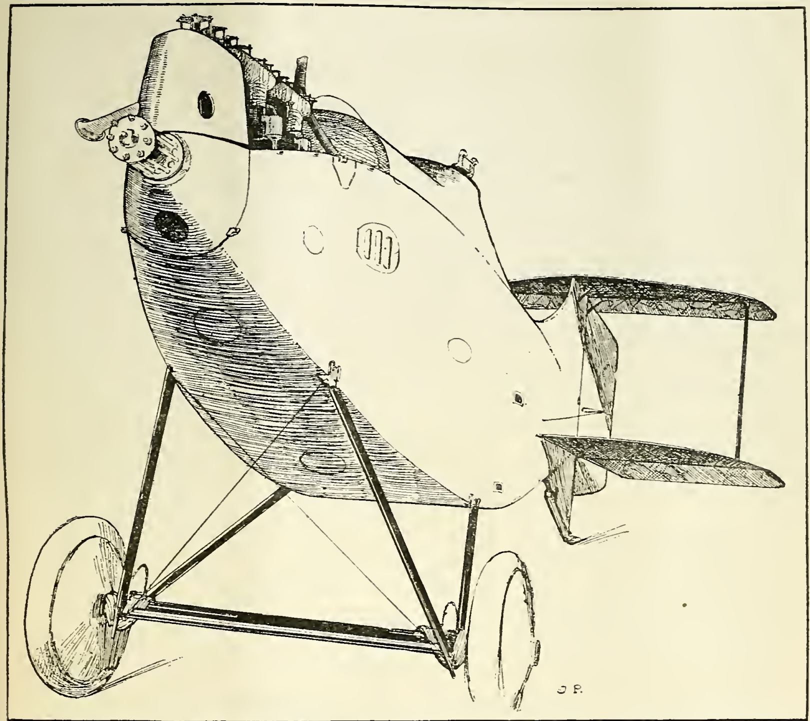
The motive power was furnished by an Argus engine partly covered in, each three cylinders of which had a common exhaust collector projecting out past the struts of the starboard "N" carrying the top plane centre section. The under carriage was of the Vee type, and appeared to follow along standard lines.

As regards the biplane tail planes, the arrangement of these will be easily followed from an inspection of the illustrations. In design they did not appear to present anything very unusual, and the only point of interest appears to be that although the two fixed planes are connected by struts there is no wire bracing. Each plane is therefore to be considered a simple cantilever, and as their section did not appear to be very deep, the strength would not appear to be all that it might. One can only wonder at the reason for employing a biplane tail. Probably it is to be sought for in the effect of the down draught from the wings, placed as they are close to the top of the body.

On the two pages following will be found three very interesting illustrations of this much discussed plane. Some of the details shown have never, we believe, been published before in this country.



THE HANNOVER OR "MYSTERY" BIPLANE.—Two views of the biplane tail. The elevator of the lower tail plane, it will be noticed, is divided, while the upper elevator is carried right across from side to side. The two elevators are interconnected by a vertical rod inside the fin, joining the cranks of upper and lower elevators.



THE HANNOVER OR "MYSTERY" BIPLANE.—Three-quarter front view of the body. The chief feature of this machine, apart from the biplane tail, is the enormously deep *fuselege,* built in the usual German fashion, of a light framework covered with three-ply wood.

Allies Bag 254, Lose 226 Aeros Since July 15

THE tremendous air fighting and consequent enormous losses of machines in the great battle are shown by official reports of both combatants. Since the resumption of the second battle of the Marne July 15, in two weeks of fighting, the French and British machines acting in conjunction have brought down 138 German aeroplanes, while the British tactical force acting independently accounted for 99 more destroyed and 17 driven down, making a total of 254 enemy machines lost.

The Germans for the same period report bringing down 226 Allied aeroplanes, showing what new production must accomplish to keep pace with the wastage.

The Allied aircraft played an enormous part in the great battle, particularly in what the British style the enemy's back areas, which consist of the enemy's lines of communication, his supports, ammunition dumps and concentrations. Aeroplanes constantly raided enemy railway stations and the Marne bridges, and silenced numerous batteries, bombed and machine gunned advancing infantry and caused innumerable casualties at the Marne crossings. The railway particularly has been harassed.

The important German strategical railway junction, Fismes, has been continually bombed with disastrous results to enemy facilities. Maisonbleau station was bombed twice, Villeneuve twice, Fere-en-Tardenois twice and Bazoches twice during the same period.

For His Country

Quentin Roosevelt—France—July 14, 1918

By Minna Irving

It was morning and Sunday, he mounted his plane
And took like an arrow the Speedway of blue;
Over trenches and dugouts and shell scarred terrain
And the Kaiser's gray legions he dauntlessly flew.
The son of his father could never know fear,
And he rose like a bird to the German attack,
And his comrades beheld him at last disappear
In a billowy cloud on the aerial track.

They listened in vain for the beat of his wings
Returning at dusk to the long allied line;
But night hawks and owls were the only live things
That soared in the moonlight's pale shimmer and shine.
"We will send," said the airmen, "an escort of Huns
To follow brave Quentin aloft in the skies."
So, behold! they are rapidly notching their guns
And sparing no Fokker or Gotha that flies!

The hangar is dark whence he wheeled his machine
And exultantly answered the call of the air,
But his country is keeping his memory green
With laurels of glory unfailingly fair.
A gallant young spirit adventuring far,
In spaces eternal he wanders at will;
So a scintillant, golden and glorious star
Is shining to-night over Sagamore Hill!

THE "GRAIN" OF WOOD WITH SPECIAL REFERENCE TO THE DIRECTION TO THE FIBERS

By ARTHUR KOEHLER

Specialist in Wood Identification, Forest Products Laboratory, Madison, Wisconsin

UPON the direction of the grain in woods used in aeroplane construction may depend the strength of the machine and the safety of the pilot. It is, therefore, of great importance that the inspector be familiar with the different kinds of "grain" and be able to determine the direction and slope of the fibres, so that he may eliminate pieces which, on account of their cross grain, would be likely to reduce seriously the margin of safety.

There are various kinds of "grain" in wood, and various uses of the word. The anual rings are often considered as constituting the grain. Woods with wide and conspicuous rings are said to be "coarse grained," and those with narrow rings, "fine grained." If each annual ring is composed of a hard and a soft layer, as, for example, in the yellow pines, Douglas fir, oak, and ash, the wood is said to have an "uneven grain," as contrasted with the "even grain" of white pine, basswood, maple and mahogany. Occasionally "uneven grain" is used with reference to woods in which the anual rings are very irregular in width. Cypress is often of this nature.

When lumber is sawed along the radius of the annual rings, it is said to show "edge grain," that is, the "edge" of the annual ring shows on the face. This is also known as "comb grain" and "vertical grain." When lumber is cut parallel or tangent to the annual rings, it is said to show "flat grain." In grading rules a slope of 45° for the annual rings is considered the line of demarcation between edge grain and vertical grain. The cross section of timber is usually called the "end grain."

For woods in which the annual rings are inconspicuous as in maple, red gum, and mahogany, the word "grain" is rarely used with reference to the annual rings. Thus the expression "coarse-grained maple," "uneven- grained red gum," or "edge-grained mahogany," is seldom used.

The word "grain" is also used with reference to the size of the pores; woods with comparatively large pores, such as oak, chestnut, ash, and African mahogany, are said to have a "coarse grain," while those with small pores, such as maple, cherry, basswood, and red gum are called "fine-grained." Painters designate them as "open" and "close grained," respectively, the former requiring a filler. Occasionally the word "texture" is used in place of "grain" in describing the width or uniformity of the rings or the size of the pores.

Since the term "grain" is used in describing a number of different characteristics of wood, it would help considerable to avoid confusion if the width of the rings were expressed by the terms "wide-ringed," "narrow-ringed," or "with rings of medium width"; the uniformity or irregularity in the structure or width of the rings, by "even texture" or "uneven texture"; and the size of the pores, by "coarse texture" or "fine texture." The terms "edge grain" and "flat grain" are more definitely fixed in their meaning and should be retained.

A common use of the term "grain" is to describe the direction in which the fibres extend in a tree or piece of lumber.

"Straight grain" means that the fibres run practically parallel with the main axis of a tree, or are parallel with the main axis of any given piece.

"Spiral grain" means that the fibres extend in an oblique direction circumferentially in the tree, so that if extended they would wind around the tree trunk, forming a spiral, (see Fig. 1). Wood which has a spiral grain, when split radially, produces a twisted surface.

"Interlocked grain," also called "cross grain," is caused by alternating layers of wood being spirally grained in reverse directions; that is, the fibres put on for a number of years may slope in a right-handed direction, and then for a number of years the slope reverses to a left-handed direction, and later changes back to a right-handed pitch, and so on (see Fig. 2). Such wood is exceedingly difficult to split radially although tangentially it splits fairly easily. Interlocked grain is common in black gum, red gum, some cottonwood, eucalyptus, and many tropical trees.

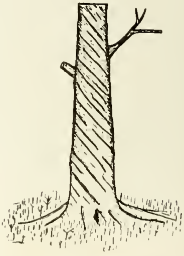


FIG. 1

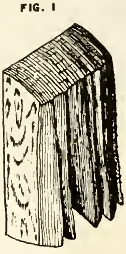


FIG. 2

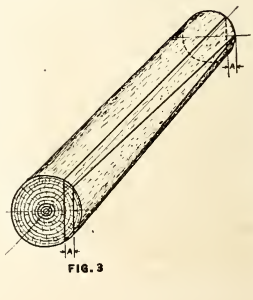


FIG. 3

Diagonal grain is the slanting of the wood fibres brought about by causes other than spiral grain in the tree. Usually it is due to sawing straight grained timber in a direction not parallel with the fibres, a procedure to be avoided, if possible, in cutting stock in which strength is an essential feature. Curvature in the tree trunk and other irregularities in the grain outside of local wavy and curly grain may, however, make it impossible to avoid the production of diagonal grain in cutting up certain logs. The common method of cutting lumber is to saw parallel with the central axis, which produces more or less serious diagonal grain in the lumber, depending on the taper of the log (see Fig. 3). Obviously, diagonal grain weakens the lumber, and several mills cutting aeroplane stock are now cutting parallel to the outer surface of the log. Diagonal grain may also be produced by cutting up quarter-sawed lumber and not getting the faces parallel to the annual layers of growth (see Fig. 4), or by cutting up plain sawed lumber and not getting the faces parallel to the direction of the fibres (see Fig. 5). Diagonal grain produced in the latter way is difficult to distinguish from natural spiral grain in the tree. However, since so far as is known, they are equally weakening, there usually is no need to distinguish between the two.

Both spiral grain and diagonal grain are also called "cross grain." Natural spiral grain can be detected by the twisted surface produced in splitting long pieces, and, according to Oakleaf*, usually by the fact that the parabolas and elipses produced by the intersection of the annual rings with the flat surface, do not extend in the same direction as the fibres.

How to Determine the Presence and Slope of Spiral Grain on the Tangential Faces

Spiral grain can be detected most easily by splitting wood in a *radial* direction. This, of course, mutilates the piece and is not always permissable. The direction of seasoning checks on the *tangential* surface also indicates the direction of the fibres. If no checks are present the direction of the resin ducts (brownish hair-like lines), which are found only in pines, spruces, Douglas fir, and larch or tamarack serves as a guide for determining the slope of the grain. In the hardwoods, especially in species in which the pores are distinct, such as ash, oak, hickory, walnut, mahogany and birch, the direction of the pores indicates the direction of the grain. Coniferous woods seem to be more subject to spiral grain than hardwoods. If the resin ducts are absent or obscure, or if the pores in hardwoods are obscure, the direction in which ink spreads will indicate the direction of the grain. This test can best be applied by using a fine pointed pen and an alcohol solution (about ¾ alcohol and ¼ water) of some dye like safranin. If the pen, dipped in the dye, is pressed slightly into the wood, the dye will spread from about ⅛ to ¼ of an inch along the fibres. The direction of the grain can be followed up by again placing the pen point at the extreme to which the ink has spread along the fibres, and so on, until a line sufficiently long to determine the slope of the grain has been made.

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*Oakleaf, H. B.—"Inspectors' Manual, Equipment Division, Signal Corps."

Some determine the direction of the grain by picking up the fibres with a knife and observing in which direction they tear out. The presence, but hardly the slope, of spiral grain may also be determined by the dip of the fibres where chips are torn out of the radial surface by the planer. With a hand lens magnifying about 15 diameters the direction of the fibres can plainly be seen. In no case should the direction of the annual rings on the tangential face be taken as the direction of the grain.

The slope of the grain on the tangential face is usually expressed as the number of units (inches or other units) along the length of the stick in which the grain deviates one unit from a radial plane parallel to the main axis of the stick. This is expressed as 1 in 12, 1 in 30, etc.

How to Determine the Presence and Slope of Diagonal Grain on the Radial or Tangential Face

Diagonal grain on the radial surface can usually be easily detected by the direction of the annual rings. The slope of the grain on the radial face is expressed as the number of units along the length of the stick in which the grain (annual rings) deviates one unit from a tangential plane parallel to the main axis of the stick.

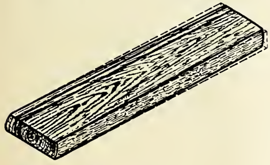


FIG. 4

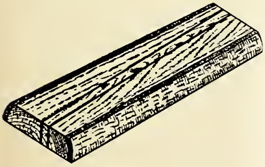


FIG. 5

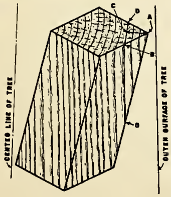


FIG. 6

Diagonal grain on the tangential surface and its slope can be determined in the same manner as spiral grain, from which it need not be differentiated.

It must be remembered that if the stick has any taper, the slope of the fibres with respect to its *main* axis, and not to the surface of the stick, gives the true slope of the grain. This is equally true for spiral grain.

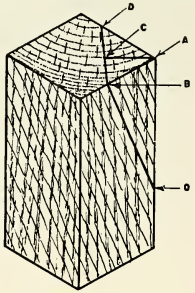


FIG. 7

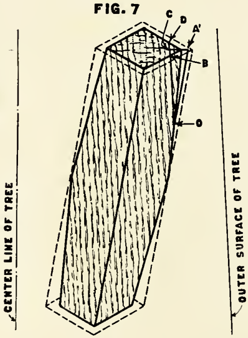


FIG. 8

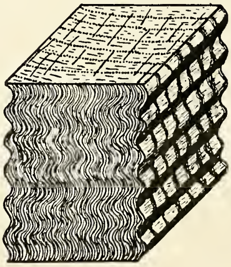


FIG. 9

The slope of either spiral or diagonal grain may be more in one portion of the stick than in another; therefore, the entire length of the stick should be examined.

How to Determine the Presence and the Slope of Spiral or Diagonal Grain When the Surfaces Are Not Truly Radial or Tangential

On shaped sticks which are round or oval in cross section, surfaces sufficiently tangential or radial to determine the direction and slope of the grain may be found. The direction of the grain in rectangular pieces may be determined as in other pieces in which the faces are truly tangential or radial, that is, by splitting, checks, direction of resin ducts, pores, medullary rays, and annual rings, or by the ink test, depending on whether spiral or diagonal grain is being looked for.

The slope of the grain in rectangular pieces may be determined as follows:

Diagonal grain.—Starting some distance from the end and on the edge farthest from the center of the tree, or on the edge nearest to the center, trace back an annual ring to the end of the stick, as O B in Fig. 6. Follow the ring across the stick, as B C D. Measure the distance from the corner A to the ring B C D. Then (the distance) A C in (the distance) A O is the true slope of the grain.

Spiral grain.—Starting some distance from the end on one of the two edges which are neither farthest from nor nearest to the center of the tree, trace back the grain to the end of the stick, as O B in Fig. 7. Draw the radial line B C D and connect A with the nearest point on the line B C D, then (the distance) A C in (the distance) A O is the true slope of the grain at that part of the stick. In some woods, and even in conifers containing resin ducts, it is often exceedingly difficult to find the proper direction for the line O B, so that splitting off a corner may be the only accurate way of finding the slope of the grain.

If both spiral and diagonal grain are present in a stick the direction and slope of each may be determined separately by the methods above.

If the stick has any taper, as is often the case in fuselage struts (the distance) A'C in (the distance) A'O (Fig. 8) is the true slope of the grain where A'O is parallel to the main axis of the stick.

Other Irregularities in the Direction of the Fibres

True wavy grain is due to a wavy arrangement of the fibres, producing undulation on a split *radial* surface. (See Fig. 9.) Wavy grained wood will split straight tangentially but the wavy direction of the fibres can be seen on the tangential surface. Irregular protuberances on the tree trunk may produce one or several "waves" in the annual rings. This is seen best on the radial face. (See Fig. 10.) In this case the waves are not as regular as when the undulations occur on the radial face. A bulge in the annual rings may indicate the presence of a pitch pocket toward the inner side of the tree.

Curly grain is an irregular distortion of the fibres as seen on the tangential surface. (See Fig. 11.) It is produced in the healing over of knots or injuries received by the growing tree. It can be detected by noting carefully the direction of the fibres or the irregular way in which the fibres are chipped out by the planer knives. The ink test is also good for determining the direction of the fibres in curly grain.

Knots.—Knots are weakening because of the distortion of grain which they produce, although they are denser as a rule than the surrounding wood. Knots start nearly always at the pith and grow in diameter from year to year, so that they are cone shaped, with the apex at the pith (Fig. 12). Knots from sprouts which come out of the side of the tree trunk do not, of course, originate at the center; but such knots are rare in forest grown material.

"Live" or "Sound" knots are intimately connected with the fibre of the surrounding, wood especially from the lower side, because here the sap brought up from the roots must flow from the sapwood of the trunk to the sapwood of the branch and thence to the leaves. From the upper side the connection is less intimate, and for this reason the cleft in a knotty piece of wood split from the lower side usually runs into the knot, but the cleft in a piece split from above may run around the knot, and the wood is more easily split.

After the limbs have served the tree for some time, the lower ones may become overshadowed by the growing crown to such an extent that they die. After a branch is dead it forms no further connection with the surrounding wood, and often if cut across, as in plain sawed lumber, it can be removed. Such a knot is called a "loose knot.' If the knot is firmly held in position, but is surrounded by bark or pitch, it is termed as "encased knot." A knot cut lengthwise is called a "spike knot," and a knot less than ½ inch in diameter is called a "pin knot."

Dead branches may persist for a number of years but eventually break off. The annual rings of wood which are formed subsequently grow over the stub. At first considerable distortion of grain may be produced when a branch heals over but eventually the grain becomes straight.

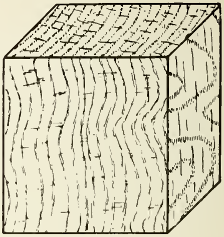


FIG. 10

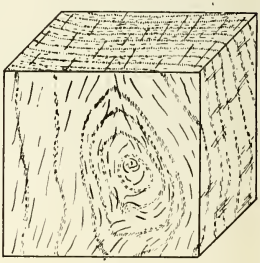


FIG. 11

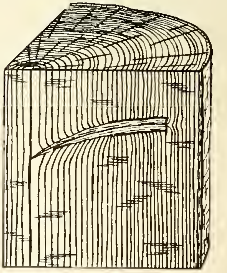


FIG. 12

Corporal James R. Doolittle

Corporal James R. Doolittle of 2,017 Caton Avenue, Brooklyn, formerly a member of the Lafayette Escadrille, who was killed on July 26th in an aeroplane accident at Buffalo, received thirteen wounds while flying on the western front, was cited for gallantry in British and French war orders, and was personally decorated with the British Military Cross by King George. He also received the Croix de Guerre.

According to his father James D. Doolittle, formerly a San Francisco publisher, Corporal Doolittle, who was born in Chicago twenty-four years ago had studied at both Columbia and Harvard Universities. In 1916 he went to France and served for a few weeks with the American Ambulance, later enlisting in the Foreign Legion.

After training at an aviation school at Buc, he had his first accident on May 2, 1917, when he fell 700 feet at Belleville, receiving seven injuries. A few weeks later he took part in bombing the Krupp Works at Essen.

On July 17, 1917, while protecting the Canadian balloon system west of Lens, he engaged four German planes, downing three before the fourth aviator wounded him four times and disabled his motor. Doolittle glided down over the first British line and was wounded again by shrapnel from British anti-aircraft guns, which succeeded in chasing away his opponent.

Returning to this country last Fall, he volunteered as an instructor in the American air service, and served at Mineola, San Antonio, Gerstner Field, La., and Dayton, Ohio. While acting as chief tester at Dayton he was injured in another fall. Then he was transferred to Buffalo.

Men on Pass Over 24 Hours Entitled to Reduced Fare

From the baffling maze of reports in connection with the reduced rate of railroad fares for soldiers and sailors comes at last a crumb of definite and detail information. This information is authentic, and, since it is issued by the Secretary of War for the guidance of Company Commanders and others concerned, is final:

The question ever uppermost in the mind of the soldier is whether, when going home on a short pass, he can derive the benefits of the two-thirds reduction in the railroad fare, or whether the privilege is to be extended but once—that is, just prior to his embarkation for active service overseas.

Bulletin No. 97, issued from Headquarters, Eastern Department, solves the question. The bulletin states clearly that men going on passes, whether they are going home or whether they are visiting relatives elsewhere, are entitled to the special form distributed to company commanders and officially known as the "furlough fare certificate." This certificate, when presented at the time the railroad ticket is purchased, entitles the bearer to travel at one third the regular rate.

Aero Post Defies Storm

Washington.—The mail aviators are demonstrating that it is possible to fly safely in any sort of weather. On July 25 Lieut. Stephen Bonsal coming to Washington from Philadelphia, encountered a terrific storm at Laurel, Md., while he was flying at a height of 5,000 feet. Without changing his course, he held on, although a heavy black cloud enveloped him, and he had no means of steering except by compass and a general sense of direction and rate of speed.

No landmark was visible for twenty minutes, yet Lieutenant Bonsal kept up his speed until he decided that he ought to be in the neighborhood of Washington, and descended sharply to find he was across the Potomac River just beyond the naval wireless station near Arlington, Va. At an altitude of 300 feet Lieut. Bonsal righted his plane and swept across the river and made a fine landing at the Polo Grounds, the regular landing place, in a driving rain. He has made the trip on schedule time.

On July 25 an important package was sent to New York by aeroplane, and at 3:45 P.M. a message by wire acknowledged its receipt. One patron of the service sends an important daily letter and has had only one failure in a month, and on that occasion the letter was delivered at 9 P.M. of the day it was mailed in Washington. Expecting it to be delivered in business hours, the sender made the failure the subject of a formal complaint.

Cost of Operating Aero Mail About Fifty Cents Per Mile

The Post Office Department authorizes the following:

The first report of the comparative cost of the operation and maintenance of the Aero Mail Service shows that the aeroplanes used in this service have broken all records for economy of gas consumption.

The total of all operating expenses of nine aeroplanes covering flights aggregating 7,234 miles, was about $3,682. The total consumption of gas representing 113 hours and 8 minutes of flying was 1,377 gallons, which is $32.50 per hour, something over 50 cents per mile. The total cost of gas was $405 in flying 7,234 miles.

The best performance in flying was made by a Curtiss J-N-4 machine, which flew 26 hours and 40 minutes at a cost of $28.01 an hour and covered 1,719 miles at a cost of 43½ cents per mile. A plane equipped with a Hispano-Suiza 150 horse-power engine used approximately 8 gallons of gas per hour, and a plane equipped with a 500 horse-power Liberty motor used 17 galloons per hour. This shows 40 per cent less gas consumed than generally required for aeroplane engines of these sizes.

The calculation of operating cost includes departmental overhead charges, interest on investment, replacement of parts, deadhead time of mechanics, gas, lubricating oils, office force, motor cycles and trucks, rent, fuel, light and telephone, pay of pilots, hangar men and mechanics.

The average consumption of gas for the nine planes was 12 gallons per hour.

Aero Mail Expansion Planned

Washington.—Rapid expansion of the aero mail service with eventual country-wide scope will begin August 1, when the aero mail service will pass from the War Department to exclusive post office control. College Park Aviation Field, 8 miles from Washington, has been selected as the new Washington terminal. Motorcycle delivery will be made from that point to the city. Army aviators returning from the war will have the preference in this service.

The first flight under the new system will begin August 1, when it is possible that another reduction in service charges from 6 cents per ounce to 3 cents per ounce with the usual 10 cent special delivery charge will be announced.

It is also planned to shortly inaugurate an 8 hour aerial mail route from Chicago to the East.

Mail 'Plane to Fly in Winter

Washington.—How to carry aeroplane mail in the snowstorms and cold of winter is a problem the Post Office Department has so far solved that Second Assistant Postmaster-General Praeger said the service between New York and Washington would be carried on steadily throughout the winter.

"We expect our 'planes to be carrying the mail when the railroads are blocked," he announced.

The chief difficulty is to prevent snow and sleet so accumulating on the windshield as to make it impossible for the pilot to see his way. This has not been entirely met, but is being studied. It is possible that more frequent stations, with stops about once an hour, will have to be arranged.

Mr. Praeger said that a New York and Boston route would be established, and there would be other new routes just as soon as winter flying had been completely mastered and the needed planes could be had without interfering with the army.

"Use of the aeroplanes in stormy weather does not claim attention by the army," said Mr. Praeger, "because observations as a rule are taken in clear weather."

The aviators will be made comfortable by electric warmers inside their mittens and in their shoes if necessary, and by heat from the engine.

Postmaster General A. L. Burleson

New Aero Mail Record

Just before 11 o'clock on August 1st, Otto Praeger, Second Assistant Postmaster-General, telephoned Postmaster Patten from Washington that the Post-office Department wanted the plans and maps of the Woodrow Wilson Airway at once. The plans were made by Henry Woodhouse of the Aero Club of America and show all routes, elevations and landing places for aviators between New York and San Francisco, crossing New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Nevada and California.

The Postmaster sent a messenger to Mr. Woodhouse and the papers were piled into a scout plane at 11:30 A. M. Two hours and thirty minutes later they were in Washington.

The time is a new record for carrying aerial mail.

Aero Mail Triumphs Over Storms

The Aero Mail Service furnished another demonstration on July 31st of the practicability of making air flights in all sorts of weather. Lieutenant Killgore left Philadelphia at 1:25 P. M. in a severe rainstorm, flying the entire distance through a blinding rain which obscured all visibility and reached Washington on schedule time—3 P. M. After leaving Philadelyhia Lieutenant Killgore broke his goggles and was compelled to fly the entire distance without protection to his eyes. He flew at the height of about 1,500 feet, and the rain and wind encountered were very heavy all the way. He was compelled to fly by compass and the guidance of judgment acquired from the experience of frequent flights over the route.

The success of the aero mail pilots in flying through the storms which destroy all visibility and subjects them to the influences of heavy winds, is regarded with great satisfaction by the Post Office Department. The ability of the pilots to fly regardless of weather is of more importance to the service than the accomplishment of extraordinary feats of speed under favorable conditions, as upon the regularity of the service rests its practical dependability at all times.

To start with, flights through storms were regarded with some apprehension lest the regularity of the service should be hampered by weather conditions. During the past two months several very severe storms have been encountered by the postal airmen, yet every flight undertaken through a storm has been successful, and that of Lieutenant Killgore was made without loss of time.

The greatest service to business which the Post Office Department expects from the Air Mail Service in winter time will be the keeping open the lines of written communication during those distressing periods following blizzards when railroads are frozen up or snowed in for days.

Second Assistant Postmaster Otto Praeger

Aerial Mail Between Vienna and Lemburg

A regular aerial postal service between Vienna and Lemburg has been established by the military authorities since March 31st last. It is understood that the postplanes of this service carry mostly official dispatches, although private mail is accepted if the letters are franked with a special stamp, for which the price is about four times the ordinary rate. The aeroplanes make the trip in about seven hours, as compared ot 17 hours by express train.

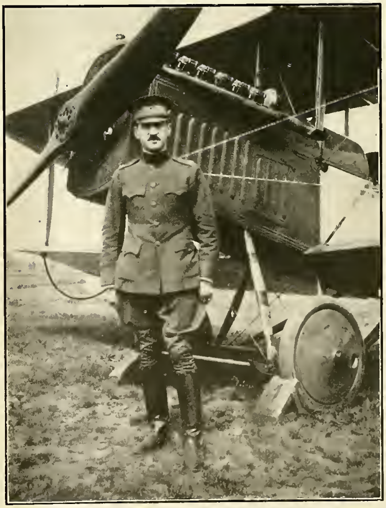
AERIAL MAIL SERVICE TO BE EXTENDED TO CLEVELAND AND CHICAGO

THE Aerial Mail Service has started in a new period of development—a new epoch which is to mean more for the future than we now realize.

Three announcements of importance in connection with the aerial mail service during the past week were (1) the announcement that the service is to be extended to Cleveland and Chicago, and (2) the delivery of six aeroplanes to be used exclusively for aerial mail purposes, and (3) to be piloted by regular aerial postmen.

We explain editorially in this number the military importance of the aerial mail service.

The delivery of six fast aero mail planes to the Post Office Department of the U. S. government by the Standard Aircraft Corporation at Elizabeth, New Jersey, in the presence of Second Assistant Postmaster Otto Praeger, and Mr. Edgerton, Captain B. B. Lipsner, Superintendent of the Aerial Mail Service; Alan R. Hawley, President of the Aero Club of America; Mr. Henry Woodhouse, Vice-President of the Aerial League of America and Editor of *Flying.* Mr. Augustus Post, Secretary of the Aero Club; Captain Robt. Bartlett of the U. S. Army Transport Service, the famous explorer; Captain Frederick Libby, Postmaster Norris of New York City, Postmaster J. F. Sinnott of Newark, Postmaster W. C. Burton of Brooklyn, Posmaster William F. Barry of Elizabeth, Mayor Byron G. Jones, and many other notable army and Post Office authorities, was one of the most propitious events for the extending of the aero mail routes. President Harry Bowers Mingle on behalf of the Standard Aircraft Corporation made the formal deliveries.



Captain Benjamin B. Lipsner, the first Superintendent of the Aerial Mail Service, U. S. Post Office. Capt. Lipsner's foresight and energy are, to a great extent, responsible for the remarkable demonstration during the past weeks which proved that the aerial mail service can be operated on schedule time, rain or shine

The Post Office authorities, officers of the army and navy, officials of the Aero Club of America, representatives of *Flying,* AERIAL AGE, and *Air Power* magazines were received at the Standard Aircraft office in Elizabeth by President H. M. Mingle, Mrs. Mingle, Vice-President W. D. Judkins, Max J. Finklestein, H. B. Williams and other officers at 11 A. M.

After an informal reception, the guests were escorted through the extensive Standard factories viewing the various aircraft being constructed there. The six fast aero mail biplanes, equipped with 150 H. P. Hispono-Suiza motors, were then inspected. For the delectation of the visitors Pilot Gardner of the aero mail took up one of the Standard machines and performed several loops, side slips, figure eights, etc. When Pilot Gardner came down he expressed great approval of the ease with which the new machine man-

(*Continued on page* 1074)

Heavy stamping press capable of punching and forming ½" steel

The working force numbers at present approximately one thousand.

The men are all skilled mechanics, either beyond the draft age or exempt on account of their value to the government in mechanical work.

Wherever possible in the minor lines of production, clerks, etc., female help has been employed, releasing the greatest possible number of men for army service.

In the Liberty Bond sales the workmen of this company have ranked high in the volume of bonds purchased in number and value in proportion to the number and income of the employees.

Multiple spindle drills working on aeroplane parts. Note the war time labor. Up to a year ago there had never been a woman on this floor

The Excelsior plant at Chicago, the home of
inally designed for the efficient and economical pr
ticularly adapted to aeroplane work.

Their first undertaking in this line was the Excelsior
tities with results far in excess of original expectations.

They are also producing a large volume of miscella
perfection and workmanship.

The plant is a reinforced concrete structure six stor

Partial view of the aeroplane motor, timing and adjusting depar

Where

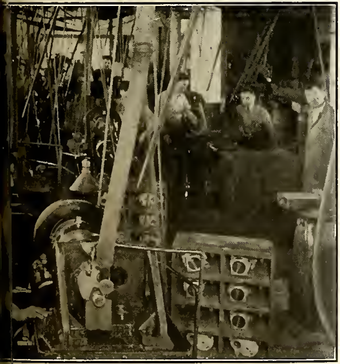
xcelsior Motor Mfg. & Supply Co., which was orig-
on of the highest type of motorcycles, has proved par-

nce-Penquin motors, which they are now producing in quan-

aeroplane parts requiring the utmost degree of accuracy in

h, over 600 ft. in length and approximately 150 ft. in depth.

the Excelsior Motor Manufacturing and Supply Company of Chicago

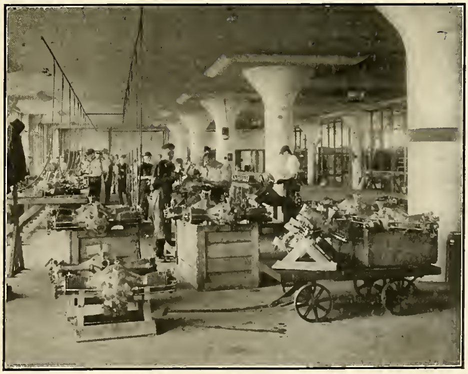


are ground

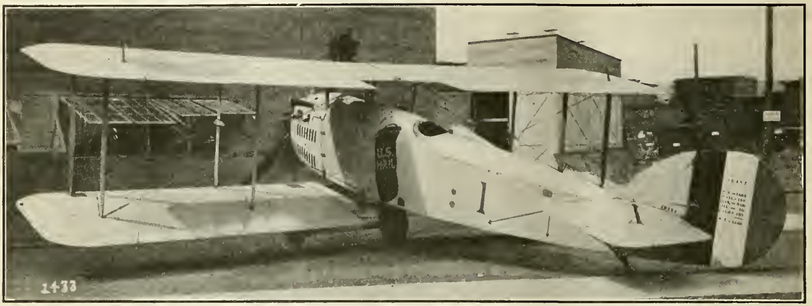
Testing aeroplane motor cylinder castings by air pressure

The mechanical equipment is the finest obtainable, including stamping mills for all classes of material up to one-half inch steel, enormous batteries of the latest milling machines, boring mills, engine and turret lathes, and automatic screw machines. There are also special departments devoted to brazing, welding, heat treating, enameling and plating.

The recognized quality of the Henderson and Excelsior motorcycles is ample evidence of the facilities of the plant and the government work now being produced is of the same high standard.



Aeroplane Motor Assembling Department



One of the six aero mail machines delivered on August 6, 1918, by President H. B. Mingle of the Standard Aircraft Corporation to the Honorable Otto Praeger, second assistant postmaster. It is equipped with 150 h.p. Hispano-Suiza Motor, weighs 1,600 pounds, will carry from 150 to 300 pounds of mail. Two of these machines flew from Elizabeth to Philadelphia in forty minutes.

(*Continued from page* 1071)

euvered and pledged himself to "no more stunts" while in the Postal Service.

An excellent buffet luncheon was then served in the spacious office and at two-thirty P. M. all repaired to the Grand Stand facing the Standard flying field. All the 5,000 employees of the factory and fully 5,000 spectators were present at the ceremonies.

President Mingle made a few remarks to the effect that he considered it a great honor for the Standard Aircraft Corporation to be able to deliver six aero mail machines to the U. S. Postal Department in addition to the aircraft of various types they were delivering to the War Department for the winning of the war. Mr. Mingle said he knew it was due to the fact that everybody in the Standard plant, from the office boy to the highest official, were working shoulder to shoulder in a "real fighting industry."

Hon. Otto Praeger was then introduced and said: "Already the aero mail service has been established between Washington, Philadelphia and New York and it has demonstrated its absolute need. It has confirmed our most cherished hopes of rapid transportation. The delivery of these new machines will, we hope, mean the further extension of the aero mail service, and let us remember that whatever contributes to improving the mail service, such as the aeroplane has done, has come to stay."

In introducing President Hawley of the Aero Club of America, Mr. Mingle said that the Aero Club of America had done more than any other organization toward educating the aeronautical public as well as the general public to the absolute necessity of establishing aero mail routes. Indeed, the Aero Club of America had been the first to advocate and the one to continually fight for the extension of the aero mail service.

President Hawley replied: "The Aero Club of America was founded in 1905, and from that date to this it has fought for the expansion of the aeronautical industry. Since 1911 it has advocated the establishment of aero mail routes between the principal cities of the country, and it has been instrumental in assisting the U. S. postal authorities in getting the necessary appropriations for aero mail routes. Ex-Congressman Murray Hulbert had done all in his power to get Congress to vote the necessary money.

"In commemoration of this auspicious event and on behalf of the Aero Club of America, I have the honor to present to the aviators, who are to fly these Standard aero machines to Washington, D. C., for delivery to the U. S. Post Office authorities, aviators' wrist watches." Mr. Hawley then presented beautiful wrist watches to Postmaster General Praeger, Captain Lipsner, Mr. Connor, Mr. Hartung, all postal representatives, "to keep time" on the following pilots, who also received watches: Max Miller, Maurice A. Newton, Robert Shank, Ed. V. Gardner.

President Mingle said that no event dealing with the establishment of aerial mail routes would be complete without a few words from Mr. Henry Woodhouse, Editor of *Flying*, who had consistently fought for aerial preparedness and the establishment of hundreds of aero mail routes. Mr. Woodhouse paid a well-deserved tribute to Postmaster Praeger, Captain Lipsner and other postal authorities.

"The winning of the war is the most important question confronting us to-day, and we, who have aided in the development of aeronautics from its infancy, are firmly convinced that the war against Germany will be won in the air! Your wonderful plant and your efficient workers in this plant will be one of the contributing factors and we congratulate the Standard Aircraft Corporation on the fighting machines which it has produced. You are a valuable asset to the cause of the Allies."

"We congratulate you also on the progressiveness which is evidenced by the six aero mail machines which stand before us, on the progress you have made towards demonstrating the commercial uses to which the aeroplane can be put. The aero mail is to be the backbone of the business of the aeronautic industry. The aero mail is the first commercial use to which the aeroplane has been put, but hundreds of other uses will be found for it in the coming years. We wish to say that the Aero Club of America and all our aeronautical publications will continue to fight, with you, for the immediate and further extension of our aerial mail service as a preparation of our fliers for service at the front, and when the war is over we hope to see hundreds of aerial mail routes all over this continent of America," etc., etc.

Captain B. B. Lipsner, Superintendent of Aero Mail Service, spoke as follows:

Captain Lipsner's Address

With the inauguration of the Air Mail Service on May 15, 1918, the aeroplane entered the commercial field.

It is not now a question of experimenting to determine the usefulness of aeroplanes as a commercial carrier. The Air Mail Service is a success, operating without interruptions by weather conditions and carrying the mail by schedule.

The efficiency of the aeroplane for war service—both to furnish eyes to the army and for purposes of combat—has been demonstrated by daring feats. The aeroplane has developed marvelous efficiency as a fighting machine, its flights have outdistanced the flights of imagination. An atmosphere of romance and wonder attaches to being transported through the air among, through and beyond the clouds; to spurning the tedious meanderings of the earth's pathways; defying the laws of gravitation and reducing heights and distances to complete subjection.

But aeronautics are not food for the mere imagination. Transportation through the air is a practical mechanical proposition. The utility of the aeriplane as a medium of commercial transportation is established. We pass from poetry to mathematics. The utilization of power with the least possible wastage of lifting energy in carrying the weight of the engine; the details of construction and the consumption of fuel are things which attract our attention. Experimentation is not directed toward determining our ability to fly, but towards mechanical devices and improvements in construction relative to stability, reliability and expense of operation.

The air mail route is the first step towards the universal commercial use of the aeroplane. All the problems involved in perfecting the commercial utility of the machine are being worked up and exact records are being kept even to the most minute details of construction; and experiments are being made in the development of devices to meet various conditions to be encountered in air traffic.

The Air Mail Service is the mechanical laboratory for the advancement of commercial aviation. The wonderful acrobatic feats necessary to aerial combat are not a feature of the flying in this service, but in their place is the necessity to make ordinary flying commonplace and to do every day common-place things efficiently. The spirit of adventure is curbed down to the exactitude of routine performance. The system of the air mail service provides for a record of performances, not only of the aviator, but of the machine; not only of the machine as a whole, but as to each of all its parts. The efficiency and defect of every part of every machine are tabulated in the record. Defects discovered are corrected. The cost of maintenance and operation are tabulated in the record and every opportunity for economy in these is noted and availed of. The consumption of fuel and the frequency of cost of repairs is carefully recorded. This record is being kept with great exactness as to every detail, showing the performance of every machine and of all its parts. The value of this is easily comprehended by you gentlemen, and you will appreciate the importance of the air mail service to the manufacturing industry of aeroplanes when you are told that this record will be available to all of you. The tests and experiences tabulated may serve to avoid the duplication of defects and continuation of errors which may be disclosed by the test of practical experience in an exacting daily transportation service.

The air mail service should have a value to the aeroplane industry corresponding to the service performed to the farmer by the Agriculture Department in accumulating information relative to operation; and in the preliminary stages of development in commercial aeronautics it would be to the aeroplane industry what the Navy has been to the steel shipbuilding industry—it will supply the incentive for construction along commercial lines after the demand for war machines no longer exists.

President Mingle then presented U. S. flags to each of the aviators. Mail was stamped on the field by Postmaster Morris of Elizabeth for Washington, D. C. Still and moving pictures of guests and officers were taken. The aeroplane engines were started, the planes took wing like eagles to their destinations. Word was later received that the machines reached Philadelphia in 40 minutes.

The guests who signed the register were: Hon. Otto Praeger, Second Assistant Postmaster General; J. A. Edgerton, Purchasing Agent; G. L. Connor, Chief Clerk to the Second Assistant Postmaster General, and J. B. Corridon, Superintendent Railway Adjustments; Captain B. B. Lipsner, Superintendent Air Mail Service, and Edward V. Gardner, aviator in the postal service; Mr. Alan R. Hawley, president Aero Club of America; Mr. Henry Woodhouse, vice-president Aerial League of America and editor of *Flying;* Mr. August Post, secretary of the Aero Club of America; Captain Robt. Bartlett, U. S. A. T. S.; Captain Frederick Libby, U. S. Aviation Service; Mr. Evan J. David, business manager of *Flying;* Mr. Leroy Gulotta, editor of *Air Power;* Thomas H. Wheless, Newark, N. J.; Walter C. Burton, Postmaster, Brooklyn, N. Y.; Wm. F. Barry, Postmaster, Elizabeth, N. J.; J. B. Corridan, Washington, D. C.; James C. Edgerton, Washington, D. C.; Henry Givan, Glen Ridge, N. J.; Walter J. McTudor, New York; E. C. Duncuff, New York; F. J. Carroll, Elizabeth, N. J.; John F. Sinnott, Postmaster, Newark, N. J.

The specifications for the planes called for a speed of 100 miles an hour and a climbing capacity of 6,000 feet in ten minutes, with a capacity of 300 pounds of mail. The staff of mechanics who will maintain the equipment are now at the factory of the Wright-Martin Corporation, New Brunswick, N. J., where the Hispano-Suiza Motor is manufactured, for observation of the latest developments in this industry. The expert riggers of the postal service have been detailed to the aeroplane factory for a detailed study of the construction of the Standard planes. The postal aviators who will carry the mail on the Washington-New York route are expert fliers and instructors in aviation.

The list comprises Max Miller, former flying instructor at San Diego, Cal., 1,000 hours in the air; Maurice A. Newton, Brooklyn, N. Y., experimental flier and instructor, 1,100 hours in the air; Robert Shank, military flying instructor, Dallas, Tex., 1,200 hours in the air; Ed. V. Gardner, advanced flying instructor, Dallas, Tex., 1,400 hours in the air; V. P. Hollingsworth, military flying instructor, Dallas, Tex., 1,000 hours in the air. Reserve fliers, E. Leroy Langley and L. B. Boldenweck.

The transfer of the flying operations of the Air Mail Service is now under way, with a view to taking over the service by the Post Office Department at the close of flying on August 10th.

Second Assistant Postmaster General Praeger has authorized the following statement of appreciation by the Post Office Department of the work of the War Department in inaugurating the Air Mail Service:

The Army has kindly undertaken to teach us the rudiments of aviation by operating the Air Mail Service until such time as the Post Office Department could obtain equipment and organize its personnel.

With the aeroplanes which the Standard Corporation has just constructed, and the planes which the War Department is about to turn over to us, together with the continued cooperation of the great fighting and technical branches of the Government, the Postmaster General is in a position to relieve the Army within a few days of the burden of operating the Air Mail Service, which it has so generously undertaken and has conducted with conspicuous success.

Much as the Army has done toward establishing a dependable daily aeroplane mail route, the Post Office Department expects to do a great deal more, building as we will upon the splendid foundation thus laid down for us.

We have no illusion as to the possibilities as well as the limitations of the present-day aeroplane. Carefully kept records on nearly 30,000 miles of cross-country work, no little of it in fog, or rain, or hail, has given us a clear idea as to what we have a right to expect of the aeroplanes now available for mail purposes. The future prospects of the Air Mail Service loom big before us. Mechanical difficulties no longer stand in the way of an immediate far-reaching expansion of the air mail, but no extension of that service will be undertaken without due regard for the War demands on our aircraft industry and personnel. Therefore its extension at this time will be gradual and always in fullest harmony with those charged with responsibility for the conduct of the War.

The Post Office Department is being besieged with proposals to operate air mail routes in various parts of the country. It is only fair to those proposing to finance air mail carrier corporations to state that at this time no extension of the Air Mail Service has been determined upon, but that looking to the future the Post Office Department is giving consideration to the operation of a daily aeroplane mail route between New York and Chicago, which would cut in half the time between the two greatest cities of the United States and bring the entire West, even to the Pacific Coast, 12 hours closer to New York and the Atlantic seaports.

Although our chief work lies ahead of us, we are proud of what has been accomplished during the past two and a-half months. During June we flew 96 out of a possible 100 legs of the air mail route between Washington and New York, with but 8 forced landings. In July we flew 106 out of a possible 108 legs of the route with but 8 forced landings. There are no surer or more courageous fliers in France than the five Army officers who put the Air Mail Service on the map through their work in fog, rain and hail.

When the fast aeroplanes which have just been completed are delivered to us, the Postmaster General will take over from the military authorities the flying operations of the air mail with a picked organization of aviators and mechanicians, full of confidence as to the future and with gratitude to the Army for what it has done for us and what it has taught us.

Monthly Report of Operation and Maintenance

UNITED STATES POST OFFICE AERO MAIL SERVICE

MAY 15-31, 1918

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone, and Water	Miscellaneous	PILOTS		HANGAR MEN		MECHANICS		Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND COST UNIT					
							Actual time	Dead time	On plane	Miscel-laneous	On plane	Shop time					Gallons of Gasoline	Total time run .min	Total miles run	Miles run per gal.gas.	Cost per hour	Cost per mile
37944	$15.75	$2.71	$11.73	$12.40	$22.06	$2.66	$26.68	$21.73	$8.35	$9.72	$102.20	$9.72	$ 9.77	$27.56	$16.66	$299.70	62	7 19	550	8.88	$40.96	$.5449
38262	20.32	4.79	11.73	12.40	22.06	2.66	16.92	21.73	1.99	9.72	21.87	9.72	125.50	27.56	16.66	325.63	71	11 56	239	3.38	27.28	1.3624
38274	75.13	21.83	11.73	12.40	22.06	2.66	73.32	21.73	2.00	9.72	140.12	9.72	11.05	27.56	16.66	457.69	258	19 50	1365	5.29	23.08	.3353
38275	77.49	25.48	11.73	12.40	22.06	2.66	68.70	21.73	1.87	9.72	167.05	9.72	142.72	27.56	16.66	617.55	262	19 24	1247	4.75	31.83	.4952
38276	54.57	10.22	11.73	12.39	22.06	2.66	66.30	21.73	1.87	9.72	152.43	9.72	27.89	27.56	16.66	447.51	185	15 40	1024	5.52	28.56	.4370
38278	73.83	20.48	11.73	12.39	22.06	2.66	96.25	21.73	18.07	9.72	352.47	9.72	51.78	27.56	16.66	747.11	245	26 40	1719	7.01	28.01	.4346
39365	27.90	5.58	11.73	12.39	22.07	2.66	14.54	21.74	6.73	9.72	68.98	9.72	5.42	27.56	16.66	263.40	93	3 00	280	3.01	87.80	.9407
39366	37.50	2.50	11.73	12.39	22.07	2.67	23.42	21.74	3.49	9.73	90.06	9.73	16.52	27.56	16.66	307.77	125	6 28	540	4.32	47.59	.5699
39367	22.80	4.28	11.72	12.39	22.07	2.67	13.27	21.74	1.87	9.73	34.97	9.73	4.22	27.57	16.72	215.75	76	2 51	270	3.55	75.70	.7990
Totals	$405.29	$97.87	$105.56	$111.55	$198.57	$23.95	$399.40	$195.60	$46.21	$87.50	$1130.15	$87.50	$394.87	$248.05	$150.00	$3682.11	1377	113 8	7234	5.25	$32.54	$.5090

Note.—Depreciation is not estimated in this report, for lack of convincing data, but is reflected in the items under repairs, parts and labor.

Items for rent, light, power, etc.; misc.; dead time of pilots; time of hangar men, mesc.; shop time of mechanics; interest on investment; and departmental overhead charges; all of which are not directly apportionable to individual ships, are pro-rated equally between all of the ships.

FOREIGN NEWS

FRANCE

The French official contains the following:

"During the fighting on July 28th and 29th the Allied aviators were active along the whole front of the battle between the Aisne and the Marne.

"On July 28th French and British bombing planes dropped over twenty tons of projectiles upon cantonments and roads in the Ardre and Vesle Valleys, and upon railroad stations and military objectives in the same region. On July 29th and the following night thirty-six tons of bombs were dropped, fires and explosions being caused.

"On July 30th Franco-British air squadrons brought down or put out of action eighteen enemy aeroplanes and set on fire one captive balloon."

GREAT BRITAIN

The aviation announcement on July 22 by the British Air Ministry says:

"July 21 the very strong west wind and low clouds almost entirely prevented flying except on a small part of the front. The machines in this sector dropped bombs on various targets, including railway stations, where a direct hit was obtained on an ammunition train.

"In combats five hostile machines were brought down. Four of our machines are missing.

"After dark the sky cleared and the wind dropped considerably, enabilng our night bombing machines to carry out raids on the greater part of the front. Thirteen tons of bombs were dropped on the railways at Seclin, Menin, Lille and Cambrai. One machine has not returned."

The official statement on aerial operations issued on July 23 says:

"In a raid carried out on the afternoon of the 22d instant the main station of Offenburg (Baden) was hit and bursts were seen on the sidings. One hostile machine was destroyed. All our machines returned.

"On the night of July 22-23 repeated attacks, attended with good results, were carried out against the enemy's aerodromes. Fires and explosions were observed. Other targets were engaged with bombs and machine gun fire."

Further details of the raid on Tondern, Schleswig, prove that the results were better than was at first believed. The early reports said only two Zeppelin sheds with the airships inside were destroyed. Later information is to the effect that a bomb was dropped on a flat building, built partly underground, and that from the nature of the building and the violence of the explosion it presumably was a magazine.

The British official communication dealing with aviation issued July 25, follows:

"On the 24th instant there was still a very strong west wind blowing and the weather mainly was overcast. Toward evening the sky cleared and a certain amount of sharp fighting and bombing took place.

"Fifteen hostile machines were brought down and three driven down out of control. Three of our machines are missing.

"During the night over twenty-four tons of bombs were dropped by us on the railways at Valenciennes, Seclin, Courtrai and Armentieres and on hostile billets on different parts of the front. Two trains were hit with bombs and thousands of rounds were fired from machine guns at various ground targets, including active anti-aircraft guns, searchlights and transports.

"All our machines returned. One of the enemy's night bombing machines was brought down in our lines by anti-aircraft gun fire."

The British Air Ministry reported on July 26th:

"On the 24th instant there was still a very strong west wind blowing and the weather mainly overcast. Toward evening the sky cleared and a certain amount of sharp fighting and bombing took place.

"Fifteen hostile machines were brought down and three driven down out of control. Three of our machines are missing.

"During the night over twenty-four tons of bombs were dropped by us on the railways at Valenciennes, Seclin, Courtrai and Armentieres and on hostile billets on different parts of the front. All our machines returned.

"One of the enemy's night bombing machines was brought down in our lines by anti-aircraft gunfire."

London.—The communication dealing with British aerial operations in France issued July 27th reads:

"On the 26th inst., during the short period of the day in which flying was possible, three enemy machines were brought down by our airmen and a hostile balloon was shot down in flames. Two of our machines are missing.

"One of our machines, reported as missing on the 25th, has since been located."

Reporting military operations on the British sector of the Austro-Italian front, a War Office statement issued July 29th says:

"In the past week the situation on the British front was quiet. Six hostile aeroplanes were brought down. Two of ours failed to return."

The following official communication was issued on July 30th by the Air Ministry:

"On the night of the 28th-29th our machines attacked the railway stations at Offenburg, Rastatt and Baden. Stuttgart and Sollingen also were attacked. Three hostile aerodromes and numerous ground targets were bombed, and subjected to machine-gun fire. All our machines returned."

On July 29th ground mist and low visibility interfered with artillery observation, but our bombing and fighting machines carried out their usual work. Eleven tons of bombs were dropped on enemy dumps and billets and fourteen hostile aeroplanes were destroyed, with the loss of two of our machines.

During the night, in spite of unfavorable weather conditions, bombs were dropped by us on Bray and Bapaume. All our machines returned.

"On the morning of the 30th instant our squadrons successfully bombarded the railway station at Offenburg. Good results were obtained. In the course of combats three enemy machines were shot down and one other was driven down out of control. One of our machines is missing."

"On July 30th haze and a ground mist again interfered with observations, but nevertheless a large number of photographs were taken by us and more than eleven tons of bombs were droppen on enemy sidings and dumps.

"Rather more enemy machines were encountered, fifteen being brought down and six being driven down out of control. Six of our machines are missing.

"During the night of the 30th two tons of bombs were dropped by us without losses. In addition to those already reported, a hostile machine was shot down by infantry fire on the 29th instant."

The official communication on aerial operations says:

"On July 31st heavy fighting took place in the air, with the result that twenty-six enemy machines were brought down and nine others were driven down out of control. Four of our machines failed to return.

"Although observation was again difficult, many photographs were taken and fifteen tons of bombs were dropped by us with good effect. During the night over twenty-three tons of bombs were dropped by us without the loss of a machine.

"Several railways, including those at Cambrai and Lille, suffered very heavily, many direct hits being obtained and a number of large fires started."

"On the morning of the 1st of August one of our bombing squadrons started to bomb Cologne, but, finding it enveloped in a cloud, turned and dropped its bombs on the factories at Duren (Rheinish Prussia), in one of which a fire broke out. All our machines returned.

'A second formation attacked the railway workshops at Treves. They were heavily attacked by large numbers of hostile machines. Three of the enemy machines were destroyed. One of our planes has not returned."

A communiqué referring to operations on the Italian front says:

"In the month of July sixty-six hostile aeroplanes were destroyed and three were brought down out of control. Four of our machines failed to return."

GERMANY

"The official statement from German general headquarters on July 31st says:

"Yesterday we shot down nineteen aeroplanes.

The following official report was issued August 1st:

"The enemy lost on the front yesterday twenty-five aeroplanes in air fights and from gun fire from the ground.

"Further, a British squadron of six big battle planes on its way to raid Saarbrucken was destroyed by six of our machines before it was able to drop its bombs. We shot down another British battleplane out of the second and following squadrons."

ITALY

The Italian war office reports the destruction of thirteen hostile aeroplanes on July 29th and five on July 30th.

Eleven enemy aeroplanes were brought down by the Italians on the front in northern Italy on July 30th and raids were made by planes which bombarded enemy railroad plants, according to an Italian War Office statement received from Rome.

TURKEY

Six aeroplanes dropped bombs on Constantinople on July 27th, according to a Turkish official report. Five persons were wounded.

Half a ton of bombs were dropped on the city on July 7th by British aviators.

Star British Flier Lost

London.—Major Edward Mannock, one of England's most successful flying men, who had 58 German machines to his credit up to a month ago, is missing, according to *The Evening Standard*.

Burning Zeppelin Falls on Dutch Soil

Amsterdam—A Zeppelin fell in flames at the German frontier near Dalheim on July 15th, the *Rotterdamsche Comant* announces.

Eddie Rickenbacher Cited in French Orders

Columbus—Lieutenant Edward V. (Eddie) Rickenbacher, former well-known American automobile racer and now an ace in the United States aviation service in France, has been cited for bravery by the French Government.

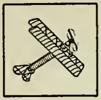
His mother, Mrs. Elizabeth Rickenbacher, of this city, received the citation on August 2 in the form of a steel engraving, signed by General Gerard of the French army. The citation was awarded for the sending down in flames of an enemy aeroplane.

Flew from Front to England, Took Oath as M. P., Flew Back

London, July 31.—According to *The Morning Post,* Major Gen. Davidson, who has been elected for the Fareham Division in place of Lord Lee, left general headquarters in France yesterday morning, came to England by aeroplane, motored from his landing place to Westminster, took the oath and sat in the House of Commons a while.

Then he went back as he had come and was probably on duty again, while the House was still talking about national shipyards.

He was anxious to take his seat before recess, could get only a few hours off, and there was no other way to come.



MODEL NEWS

Edited by John F. McMahon

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
90th St., 7th Ave., Brooklyn, N. Y.
PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
CORRESPONDENCE MODEL AERO CLUB
Babylon, Long Island
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.

TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska
DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
TEXAS MODEL AERO CLUB
517 Navarro St., San Antonio, Texas

SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.
CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Model Aeroplane Building as a Step to Aeronautical Engineering

Before attempting to build the Scale Model Curtiss J N 4-B shown in the accompanying drawings, I would advise the model builder to construct a full size drawing from the dimensions I have given. A full size drawing would save time and trouble and each part could then be cut to the exact length before assembling, which would save considerable work in constructing the model. Without a drawing the model builder would have to cut each part and then attempt to fit it in the machine with the result that it would be the wrong shape or size and another part would have to be made.

To construct the model proceed as follows: lay out each side of the fuselage first. Care must be taken when cutting the longerons. The fuselage you will notice is 22⅞" long, but the longerons are curved and of course should be ¾" longer to allow for bending. To bend, I would advise holding over a jet of steam emerging from a kettle and slightly straining until the proper shape is reached. If possible I would advise the model builder laying the drawing on a flat piece of wood and placing tacks along the outside edge of the fuselage lines and bend the longerons around these which would save time, give the correct shape, and insure against the snapping of these members. When shaped put the struts in place and fasten by applying a little glue to the end of the strut and then use a very small nail to hold in place. It may be necessary to drill a small hole to guard against the splitting of the wood.

When two sides are finished put in the top and bottom struts. The plan of the top and the bottom of the body is shown at the lower left of the drawing. The model builder will notice that the top struts are shown clearly and the bottom struts are supposed to come directly underneath the top, except where the struts are shown by dotted lines, these are bottom struts and are placed to take care of the slant of the wing side struts.

Next make the motor stick which consists of a special shaped fitting at one end and a hook for fastening the rubber at the other (I may mention that all the fittings such as propeller shafts, wheels, struts, sockets, wood, bamboo, etc., used in this and all the models following, may be purchased from a Model Supply House. I have just received a very complete catalog from the Wading River Manufacturing Company, 609 Broadway, Brooklyn, N. Y., which has just been revised and if model builders do not care to wait for the drawings in Aerial Age they may secure the full drawings of a Standard Curtiss J N 4-B from this Company).

To complete motor stick place a ball bearing propeller shaft in the fitting at the front of the machine. I would advise fastening the motor stick in two places only and about two inches apart at the front of the machine. This is best, because when rubber is twisted to give power to the propeller it has a tendency to twist the motor stick, and if this was fastened all along the body it would twist the body out of shape.

The landing chasis is made of ¼ x ⅛" wood cut to the lengths specified after which they must be made to a streamline shape. I would advise making little plates of thin brass to fasten the struts together and also to fasten the struts to the fuselage, but if the model builder thinks he could do the work better some other way he is at liberty to do so. The axle is a regular 6" x ⅛" Brass axle and the wheels 2" in diameter. After placing landing chassis fittings in place on the fuselage, place a wing strut socket directly over it, to take the wing spars when we will finish them.

The "Turtle Deck" over the body is made of a few strips of thin wood as shown at the lower right of the drawings. The half round pieces are then drilled out for lightness as shown. The strips of wood are merely laid over the formers and fastened with glue. This portion is put in place only to preserve the streamline of the body and should be made as light as possible.

The portion where the pilot and observer are supposed to sit is made of thin aluminum, holes being cut to represent the cockpits. This part is fastened to the end of the motor and the "Turtle Deck" by small nails.

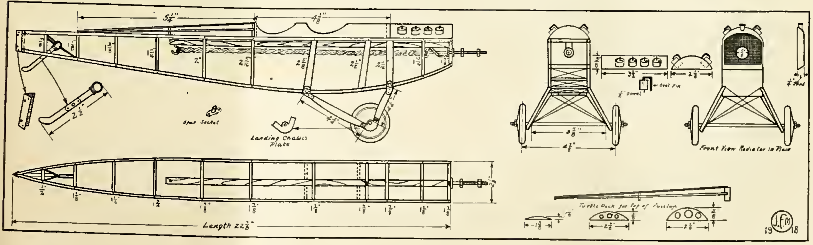
The motor is made from a piece of wood shaped to a half round section, holes being drilled to take the imitation cylinders which are made of pieces of dowel sticks with a bent pin inserted to represent valve push rods. Paint the cylinders and engine cover with aluminum paint.

The Radiator is also made of wood. The outside or imitation casing is painted aluminum, the inside having vertical and horizontal lines of black paint or ink as shown. When finished drill a hole, as shown, to admit the propeller shaft to project.

The tail or rear part of the machine should be kept as light as possible without sacrificing strength because we must keep the centre of gravity of the model as far forward as possible to make the machine exactly to scale. This is the main reason I have limited the length of the motor stick.

In the next article we will build the wings.

(*To be continued*)



NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas. Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Note 1—Report to places mentioned in order named for temporary duty.
Note 2—Report to O. i/c Fisher Body Corp., Detroit, Mich.
Note 3—Report to C. O., Cristobal, Canal Zone, Panama
Note 4—Report to Recruit Receiving Station, Fort Wayne. Mich.
Note 5—Report to Chief Inspector, Akron, Ohio.
Note 6—Report to Camp Sherman, Ohio.
Note 7—Report to C. O., Aberdeen, Md.
Note 8—Report to O. i/c Dayton-Wright Aeroplane Corp., Dayton, Ohio.
Note 9—Report to Dis. Mgr., Aircraft Production, 480 Lexington Ave., N. Y. C.
Note 10—Report to Rubay Co., Cleveland, Ohio.
Note 11—Report to Fort Kamehameha, Honolulu, Hawaii.
Note 12—Report to aviation repair depot, Speedway. Indianapolis, Ind.
Note 13—Report to Signal Corps Camp, Fort Leavenworth, Kans.
Note 14—Report to Union Switch and Signal Co., Swissvale, Pa.
Note 15—Report to Col. J. G. Vincent, Dayton, Ohio.
Note 16—Report to Dis. Mgr. Production, 400 Lexington Ave., N. Y. C.
Note 17—Report to Army Balloon School, Lee Hall, Va.

Special Orders Nos. 164—169, Inclusive

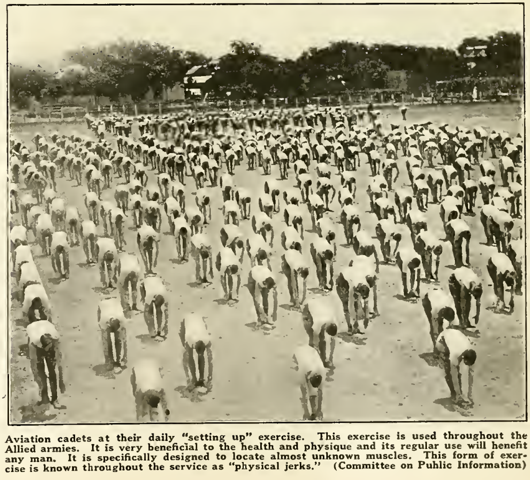
A

Aehle, Truman H.	DIK
Atwater, Allen Russell	SLA; DAP
Adler, Elmer Edward	FLA; DAP
Ailsworth, Richard E	DIK
Appleman, Earl	TFT
Adams, Chester A	FRF
Arthur, William Hamilton	SLA; BPT
Alexander, Paul	SLA; CGC
Atkins, Charles M., 3rd	MAC
Adams, Carlisle Gilliam	SLA; CGC
Ainslie, Walter M	BST
Ambrose, John Leftin	SLA; EOT
Ayars, Milbert P	EOT
Aldridge, William S	EOT
Aven, William R., Jr	EOT
Allen, Leon B	TFT
Aschenbrener, Randolph Alois	SLA; PFO
Applequest, Jerome Anthony	SLA; Note 14
Aub, Anthony W	Note 4

B

Barre, Martin Luther	SLA; PFO
Baird, Andrew	SMM
Blunk, Adolf	SMM
Brant, Gerald C	DMA
Brown, Ernest Levi	SLA; CFT
Baker, Earnest B	SMM; FRF
Baisley, Herbert K	FRF
Bastow, Joseph G	FRF
Berger, George Reis Bart	SLA; DAP
Burrage, Albert Cameron	FLA; DAP
Brown, James Henry	FLA
Bryant, Daniel Joseph	SLA; CFT
Brissell, Willard S	TFT
Baker, Frederick Amos	CPA; DAP
Blue, Harry N	FRF
Brooks, Hugh	FRF
Brubaker, Lawrence	EOT
Brocke, Leon Charles	SLA; BFT
Bouquet, Uric L	EOT
Busk, Stephen L	DIK
Blake, George E	TFT
Browne, Lucien W	DIK
Butner, John C	SMM
Birks, George Raymond	SLA; FOB
Baker, Gordon	FRF
Buchanan, Wallace E	DIK
Bourman, Charles A	DIK
Bouligny, Ralph H	CSO
Bingham, William Frederic	SLA; PFO
Bennett, Samuel C., Jr	FLA
Blackler, Perry Wells	SLA; SBI
Barrett, Arthur E	DIK
Booth, Lyman	DIK
Brennan, Edward W	DIK
Brenton, Walter	DIK
Buford, Bennett G	DIK
Birch, Charters Ward	SLA; SBI
Berkin, Jay J	SLA; CGC
Burroughs, William M	TFT
Blackburn, Daniel M	TFT
Baukat, James G	TFT
Buswell, Walter S	SLR; DIK
Brosnan, Hugh Murphy	SLA; EOT
Braun, Milton Frank	SLA; CRI
Beymer, Oliver Herbert	SLA; PFO
Beil, Richard Maybeck	SLA; GLC
Bartley, James Goss	CLA; CGC
Barker, Charles Morse	SLA; GLC
Brown, Fred Yates	SLA; CGC
Busher, Julius Eugene	SLA; CGC
Bagby, Charles Todd, Jr	SLA; CGC
Benedict, Maurice T	DIK
Benson, Hardy M	DIK
Bible, Dana X	DIK
Brown, George R	DIK

Burdick, Harold B	DIK
Batzle, Louis John	WAC
Bancroft, Winthrop	Note 17
Breckinridge, Ban J	WFO
Baker, Joseph S	SMM
Bridges, Kenneth L	DIK
Butler, Ben I	DIK
Boyd, John P	Note 2
C	
Cutler, Clarence Meredith	SLA; SBI
Cavagnaro, James F	TFT
Clarke, Thomas Augustine	SLA; DAP
Crom, George Curtiss, Jr	SLA; PFO
Congdon, James Russell	SLA; PFO
Caseholt, Kirhy Quentin	SLA; DAP
Chalifoux, Harold Leufroi	FLA; DAP
Collins, William F	FRF
Clark, Harold M	DMA
Chamhers, Karl D	DMA
Chapman, William B	FRF
Coleman, Rohert Henry	SLA; SBI
Creedon, John Henry	SLA; SBI
Canady, Earl L	DMA
Christensen, Ezra A	DIK
Carmichael, Amos E	FRF
Curtis, Erland L	DIK
Carmine, John W. S	TFT
Cook, Frank F	DIK
Cooper, Francis J	DIK
Carlton, Henry F	TFT
Cowen, Edward G	SMM
Copeland, Jay Milton, Jr	SLA; SBI
Crouch, Lloyd Henry	SLA; RSD
Crowell, Rohhins P	FRF
Carryl, Frank M	LHV
Crane, Sheldon Cyr	SLA; CGC
Crossan, Spruille Burford	SLA; CGC
Chatterson, Marshall Cragg	SLA; KST
Converse, Julian Langston	SLA; EOT
Cassidy, Holland M	DMA
Cox, Arthur S	FRF
Cochran, Rohert B	DIK
Clawson, Harry O	DIK
Crumley, Charles L	SMM
Carlson, Frank N	EOT
Chaplin, Winthrop L	EOT
Chester, Andrew E	EOT
Cleveland, Waldo A	EOT
Collier, Henry L	EOT
Cornell, George C	EOT
Couherly, Lawrence B	EOT
Craig, William W	EOT
Cover, Carl Anson	SLA; KST
Clark, Reuben G	KST
Chase, Samuel W	DIK
Chapin, Charles G	CGC
Condit, Paul Grandin	SLA; CGC
Clarke, Howard Reginald	SLA; CGC
Collins, Lyman Irving	SLA; Note 7
Connell, Samuel M	Note 8
D	
Dillaway, Manson M	TFT
Dixon, Richard H	DMA
Davis, Paul Adams	SLA; RSD
Dapron, Fayette A	DMA
Davidson, Kenneth S	TFT
Drescher, Herhert	TFT
Dudley, Chester P	FRF
Denny, Joseph Johnson	SLA; DAP
Dougherty, James E	SMM
Dyche, Justin K	FRF
Daly, George Sylvester	DIK
De Arce, Leroy P	TFT
Dickey, George Leon	SLA; SBI
Dawson, Thomas Edward	SLA; CRI
Des Champs, James W	DIK
Dunn, Walter V	TFT
Dougherty, James	FRF
Dresser, Burtis E	CAF
Delashmutt, Harry A	PFO
Dion, Elzear Nicholson	SLA; CGC
Drane, Hayward Benton	SLA; CGC
Duryee, Andrew B	FLA; DMA
Davidson, Carleton F	EOT
DeGroot, Horace E	EOT
Delany, Russell W	EOT
Douglas, David D	DMA
Doherty, James F	DMA
E	
Estep, Edwin Ralph	FLR; DMA
Emerson, Sumner B	FRF
Ettenger, Edwin Lloyd	SLA; SBI
Eddy, Arthur E	CGC
Eliason, Carl Grammer	SLA; SBI
Earley, Charles Augustine	SLA; SBI
Epp, Otto C	TFT
Evert, Paul	FRF
Endress, Clarence Henry	SLA; PFO
Ennis, Arthur Ignatius	SLA; EOT
Emerson, Sigard A	Note 8
Emery, William Harrison	SLA; SBI
Erickson, Robert	SLA; LDT
Ekhlom, John Olaf	SLA; SBI
F	
Fleischman, Max C	DMA
Frank, Walter H	FRF
Fountain, Ray C	FRF
Finter, Clyde V	CGC
Frazier, Edward J	EOT
Fountain, Roy C	SMM
Fluer, Peter E	DIK
Farrar, Delwin B	TFT
Fisher, Floyd C	DIK
Freeman, Orville B	DIK
Franklin, John A	TFT
Fulwilder, James Henson	SLA; AAD
Foster, Lindsay B	EOT
Fleming, Carl S	SLR; DIK
Fairfield, Edward M	LHV
Fawcett, Richard Hartshorne	SLA; SBI
G	
Galentine, Norman Eddy	SLA; FOB
Grose, Ronald	SLA; CFT
Gleaves, Richard D	FRF; SMM
George, Jesse Warren	SLA; SBI
Greene, Charles Carroll	SLA; SBI
Grady, Anthony J	DIK
Griswold, Clifford B	TFT
Gravely, William S	EOT
Graves, Gilhert S., Jr	FRF
Garrison, George C	EOT
Grethen, John P	SLA; CRI
Garretson, William Voorhees	SLA; SBI
Garman, Stanley Cortland	SLA; CGC
Grover, John H	SAG
Guillemette, Joseph Dydime	SLA; PFO
Guffanti, Alexander J	FRF
Green, Warren K	SLR
Gardiner, Chandler B	DIK
Grimes, Carl Allen	SLA; KST
Gihlon, Earl Zenneth	FLA; Note 9
Griffin, Howard P	Note 2
H	
Hull, Justus Miles	SLA; BFT
Harris, Robert Fitton	SLA; BFT
Hanchett, Frederick Williams	SLA; BFT
Hammond, Fred R	FRF
Hunt, Roy E	GLC
Handwerk, Morris C	SMM
Hayes, Martin A	SMM
Hornsby, Auhrey	FRF; SMM
Hughes, James B	FRF; SMM
Heald, Rohert Storie	SLA; FOB
Husey, Clyde L	RSD
Hangan, Alfred J	EOT
Hirsch, Morriss W	EOT
Heward, Harlan L	CGC
Hart, William Clark	SLA; BFT
Hanson, Archie M	DIK
Hill, James A	DIK
Hallherg, Lloyd Clarence	SBI
House, Edwin J	LHV
Henderson, Elmer J	FRF; PFO
Harvey, Robert B	PFO
Hogue, Mark C	PFO
Henderson, Denny E	DIK
Harris, Rudolph T	SLA; EOT
Heise, John Irvin	SLA; CGC
Harris, Alfred Richard	SLA; EOT
Horn, Norman E	FRF
Hastings, Edward R., Jr	BST
Haworth, George W	BST
Hanlon, William J	PFO
Hawkins, Emin W	PFO
Hillhouse, John G	PFO
Holloman, Barrett W	PFO
Howard, John W	SLR
Hardy, Donald E	SMM
Hait, Roswell N	FRF
Hone, Charles N	TFT
Hanson, Etanwood L	TFT
Hersey, George F	Note 5
Haden, Clifton James	SLA; CGC
Harmon, Frank H	PFO
Harsey, Wilmot B	SLR; DIK
Hooker, Charles J	SLR; DIK
Horne, George W., Jr	CGC
Henderson, Hugh M	DIK
Hanes, Harold F	Note 2
Hunt, Spencer S	Note 8
I	
Ingraham, Forrest W	TFT
Irwin, John Rohert	SLA; PFO
J	
Jones, Roderick H	DIK
Jones, Charles Alvin	SLA; PFO
Jones, Clifford E	TFT
Jones, Roy L	DIK
Jones, Henry S	GLC
Johnson, Charles C	WFO
Johnson, Everett B	FRF
Johnson, George T	DIK
Jenkins, James W	FRF
Jacohs, Arthur Ray	SLA; PFO
Jenkins, Benjamin Francis	SLA; BFT
Jones, Francis David	SLA; SBI
Jackson, John Sidney	SLA; GLC
Jackson, Karl Russell	SLA; PFO
K	
Kenely, John Charles	SLA; DAP
Kelly, John H	WFO
Keene, Charles W	DMA
Kelly, John K	CGC
Kent, Arthur Ogden	SLA; CFT
Klinger, Kenneth P	EOT
Krapf, George W., Jr	KST
Kirkpatrick, George M	DIK
Kingsbury, Orrin D	SLA; SMM
Kerr, Frederick M	FRF
King, Gelston T	TFT
Kalkman, Eugene C	EOT
Knowlton, George E	EOT
Kirkpatrick, Everett L	DIK
Kesling, Ernest E	DIK
Kelly, Bernard E	TFT
King, Lawrence Sprague	SLA; BFT
Kelly, John O'Reilly	SLA; CRI
Kernan, William F	DIK
King, Harry C	Note 8
Kelleber, Melvin B	Note 2
Klemin, Alexander	SLA; Note 15
Kincade, Franklin P	Note 12
Knudsen, Herlef A	Note 12
L	
Lewis, Arthur R	SLA; AAD
Lewis, Harold E	FRF
Lippman, Frank E	EOT
Leanhradt, Elmer G	TFT
LaBoiteaux, Andrew J	TFT
Lahti, Enoch Llmar	SLA; DAP
Lachmund, Harry G	TFT
Laird, Homer U	SMM
Lindstrom, Ernest W	TFT
Lindridge, Charles D	CSO
Lycurgus, Presley Alexander	SLA; DAP
Lucas, Ottis P	SMM
Low, James B	DIK
Larkin, George R	TFT
Ledhetter, Thomas D	FRF
Lawton, Edgar H	FRF; SMM



Aviation cadets at their daily "setting up" exercise. This exercise is used throughout the Allied armies. It is very beneficial to the health and physique and its regular use will benefit any man. It is specifically designed to locate almost unknown muscles. This form of exercise is known throughout the service as "physical jerks." (Committee on Public Information)

Lamley, Russell Wayne............SLA; LDT
Lynch, Francis Joy...............SLA; RSD
Landreau, Norman Bayly..........SLA; EOT
Lievre, Joseph Benjamin..........FLA; KST
Logan, David M........................SMM

M

Mullin, Thomas Edward...........SLA; PFO
Marshall, Charles H......................SRC
Miller, Archie...........CGC; WDM; Note 1
Malefski, Nathan..........................KST
Marks, Henry Gerson..............SLR; DAP
Miller, Euclid D..................FRF; SMM
Miskovsky, Robert J.....................SMM
Martin, William T........................DIK
Mooney, Herbert R.......................EOT
Morgan, Harry R..........................DIK
Maynard, Kenyon C.......................FRF
Metzger, Carlisle L.......................FRF
Morris, Hardin.............................FRF
Midcap, Clarence L.......................EOT
Miller, Eugene J..........................DIK
Martin, Douglas E........................DIK
Mercer, Robert A.........................DIK
Mitchell, Oliver F.........................CGC
Morgan, Marion Hewitt, Jr.........SLA; CRI
Mason, Ernest J............................TFT
Monteith, Darrell M.......................TFT
Murray, John D............................DIK
Meyer, Edward.............................DIK
Miller, Frank M............................TFT
Mueller, Ralph H..........................DIK
Morehead, Joseph H.......................TFT
Milner, Paul C.............................DIK
Moore, James Maxwell............SLA; GLC
Montgomery, Roe Floyd...........SLA; LDT
Mooney, Clarence Bernard........SLA; GLC
Mayer, August C...................SLA; CGC
Mabry, Harry C...........................SMM
Magill, James R..........................SMM
Morris, Charles W........................SMM
Murphy, Charles C........................SMM
Maxwell, Warren Arthur...........SLA; KST
Miskell, James B...........................DIK
Merrill, Carlton H.........................MAC
Moss, Harry Stuart................SLA; CWT
Martin, John Halsey................SLA; KST
Martin, John Leonard..............SLA; CGC
Marsden, Ross Slyfield.............SLA; KST
Moll, Norman Louis................SLA; CRI
Miner, Vern Edgar..................SLA; CAF
Merder, Parrish Davis..............SLA; CAF
Monsch, Sterling Raymond.........SLA; CAF
Morgan, Dwight Cadogan, Jr........SLA; TFT
Magee, Richard H.........................BST
Miller, Colin U............................BST
Moore, William R.........................BST
Mountcastle, Paul.........................BST
Miller, Robert L...........................FRF
Magee, Christopher.................SLA; TFT
Mohr, James H.............................EOT
Morgan, Daniel C...................SLA; CJS
Metzger, Carlisle L........................TFT
Mehaffey, Carl A........................Note 3
Merrell, Cyrus W........................Note 5
Morrow, Karl C..........................Note 2

Mc

McCollough, John M.....................SMM
MacDonald, Russell Carrigan........SLA; BFT
McCullough, Charles B..................HHN
McCutcheon, James D............FRF; SMM
McCally, Ross L...........................CGC
McKeever, James L........................DIK
McDougall, Kenneth.......................TFT
McCaddam, Glen J........................DIK
McDonald, Samuel F......................TFT
McKnight, James A.......................TFT
McLaughlin, John J.......................TFT
McIntosh, John Francis............SLA; CGC
McQuistion, Rolla Hunter..........CPA; DAP
McDonough, Andrew L...................DIK
McNott, James............................CUI
McPeak, Stanley....................SLA; CGC
McCormack, Karl Newton..........SLA; KST
McKnight, Ewell...........................BST
McVickar, John B.........................TFT

N

Night, William J..........................EOT
Nichols, Earl Brazil................SLA; CGC
Nash, David M.............................FRF
Nash, DeLloyd D..................FRF; SMM
Norwood, George M......................EOT
Nunenmacher, Francis W................FRF
Nethercut, William R.....................SMM
Norgren, Nelson H........................DIK
Nelson, Luther.............................FRF
Noyes, Linwood I.........................SMM
Northwall, Maurice E.....................FRF
Nelson, Clyde Keith................SLA; CAF
Nilson, Edgar C............................BST
Neuberger, Lawrence B...................CGC

O

Overton, Robert E. L..............FRF; SMM
Owens, Sobieski B........................CSO
Ormshee, Harry S.........................DIK
O'Brien, Mattheu H.......................TFT
O'Brien, James H.........................SMM
Officer, Herbert George...........SLA; GLC
Owens. John S.............................FRF
Oswald, Fred.......................SLA; GLC

P

Palmerlee, Joseph B......................EOT
Payson, Randolph..................SLA; CRI
Powel, Harcourt....................SLA; CGC
Packard, Harold A........................SMM
Pinkham, Henry P.........................DIK
Powderly, Daniel W......................DIK
Patton, Frank C............................FRF
Peterson, Amos Gale...............SLA; LDT
Palmer, Walter.............................FRF
Penland, Clifford H.......................EOT
Partridge, Clinton E......................TFT
Patton, Frank C...........................SMM
Perry, Maurice Raymond...........SLA; SBI
Prindle, William D........................EOT
Pace, Floyd A..............................TFT
Pratt, Daniel H............................DIK
Patton, Hilton M..........................CGC
Plaut, Leonard.............................DIK
Purcell, Lawrence J....................Note 11
Price, George W........................Note 17
Potosky, Walter David.........FLA; Note 10
Pinto, Peter Philip..................SLA; PFO
Park, James William................SLA; TFT
Price, Walter Emmett..............SLA; GLC
Plosser, Joseph Benjamin..........SLA; GLC
Perry, William Radcliff...................DAP
Proctor, Willis H..........................FRF
Plantz, Edward Clune..............SLA; GLC
Peterson, Helge A.........................DIK
Pickney, Dunbar W.......................DIK
Penick, Mark A............................DIK
Powell, James F...........................SMM
Peake, Junius B...........................SMM
Piper, Raymond A..................SLR; DIK
Pearson, Charles P........................TFT

Q

Quinn, Thomas C..........................TFT
Quinnell, George C........................DMA
Quimby, Elbert Whitney...........SLR; GLC

R

Rowlinson, Walter S......................DIK
Rivera, Reynaldo Jose.............SLA; BFT
Rosaire, Esme, Eugene.............SLA; BFT
Readio, Roger Frank................SLA; BFT
Rubel, Laurende Elias.............CPA; DMA
Rheinstein, Alfred.........................RSD
Russell, Howard F.........................DIK
Roach, Howard L...........................DIK
Rogers, Franklin L........................TFT
Reyerson, Wallace E......................DIK
Ristine, Richard H........................GLC
Rich, Edwin Ewin...................SLA; CFT
Rittenhouse, Paul L.......................CSO
Riddle, Earl C..............................TFT
Robinson, Clarence B.....................EOT
Rose, Joseph W............................TFT
Runkle, Charles C.........................DIK
Ross, Joseph Hennessey...........SLA; DMA
Rowe, Elmer Clayton...............SLA; CRI
Rowe, Thomas John.................FLA; DAP
Robinson, Malcolm G......................FRF
Ranney, Lynn Anderson............SLA; GLC
Robinson, Hyman I........................DMA
Roullott, John P........................Note 2
Reitenbaugh, John S...................**Note 2**
Rose, Waldo H.............................LHV

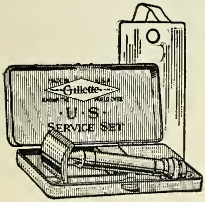
S

Sintzenich, Arthur Harold Cue.....SLR; SRC
Stewart, Ralph Berry...............SLR; MSC
Schumacher, Charles H...................FRF
Sanborn, Thor Warren.............FLA; VBW
Seward, Jackson Anderson..........SLA; CFT
Spivey, Lloyd G...........................SMM
Snyder, Laurence N.......................DIK
Swain, Francis W.........................SMM
Saltsman, Irl L.............................CGC
Scott, Robert C............................SMM
Smith, Clarence............................DIK
Seawell, John L............................DIK
Struby, Walter Vanderveen........SLA; FOB
Steele, James J............................SMM
Simon, Gerald H...........................DMA
Shaw, Donovan L..........................TFT
Stitt, Donald G.............................FRF
Smith, Clarence A.........................DIK
Strange, Robert............................FRF
Shea, Thomas Francis..............SLA; CFT
Stevenson, Norman M.....................DIK
Sansome, Frederick A.....................EOT
Steward, Wayne D.........................TFT
Sauls, Jesse W.............................TFT
Shillington, Waldo E......................TFT
Scott, Ernest D............................DIK
Sandlin, James H..........................DIK
Spencer, George S.....................Note 16
Smith, Glanton..........................Note 6
Selts, William A...........................LHV
Seward, Jackson A........................LHV
Shepherd, Herbert R......................LHV
Setzler, Harry G...........................LHV
Stanley, Robert H.........................LHV
Stinson, David R...........................LHV
Stone, Percy N.............................LHV
Stout, Minor W............................LHV
Stutzman, Theodore.......................LHV
Strother, Samuel P........................LHV
Sutherland, Alexander G..................FRF
Sweitzer, Leonard Edward..........SLA; PFO
Stauffer, John Littleton............SLA; KST
Sloan, Abram L.........................Note 13

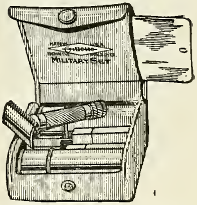
(*Continued on page* 1086)

A German aeroplane scout of the Albatros type, which was forced to land by a pilot in the British Royal Air Force. The Canadian soldiers were able to overpower the German pilot before he was able to set fire to his machine

Gillette SAFETY RAZOR



The New U. S. Service Set—A solid metal case, heavy nickel-plated and embossed with the Insignia of the U. S. Army and Navy. Strong, thin, compact: $1\frac{7}{8}$ inches wide, 4 inches long, $\frac{5}{8}$ inch thick. 12 double-edged Gillette Blades (24 Shaving Edges). Contains a nickel-plated Gillette Safety Razor and Blade Box. Indestructible Trench Mirror inside the lid. **$5**



Military Set No. 18—For Uncle Sam's Officers, a Gillette Combination Set, in case of U. S. Regulation Khaki twill — nickel-plated "Bulldog" Razor; indestructible Trench Mirror fitted in pocket in lid; Shaving Brush and Stick Gillette Shaving Soap in nickel-plated Holders; two Blade Boxes; 12 double-edged Gillette Blades (24 Shaving Edges). **$7**

The most practical of men is the fighting man

When it comes to razors, the fighting man wants his Gillette.

It saves him space. It saves him weight. It makes his shaving clean, quick, safe. It is the razor used by his bunky and his messmates — by his comrades under all the flags of the Allied Nations.

The Gillette is the *Service Razor* the world over.

Have you seen the new Gillette Sets specially made for the fighting man? Two of them are illustrated on this page. They were designed by members of the Gillette Organization in the Service — men who know what the fighting man is up against.

Simple and compact, fit the pack, the pocket or the ditty box. No strops or hones to clutter up the kit. Blades always sharp, always ready. No Stropping—No Honing. When a man wants new Blades he can get them in any Post Exchange, Ship's Canteen, or Y. M. C. A. Hut, here in America or overseas.

Our Paris Office carries stocks — is constantly supplying the American Expeditionary Forces. Gillette Safety Razors and Blades on sale everywhere in France, England, Italy, and the Eastern battle fronts.

Gillette Safety Razor Co.
of Canada. Ltd.
73 St. Alexander St.
Montreal, P. Q., Canada

Gillette Safety Razor Societe
Anonyme
17 Bis, Rue La Boetie
Paris, France

Here's the Way to Get 100% Efficiency Out of Your Gillette

Try this when you shave tomorrow morning. Lather the beard thoroughly, and rub well in — that's essential with any shave.

Put in a new blade and screw the handle down *tight*. If you want a specially close shave, *unscrew* the handle a *part turn*.

Hold the razor *naturally* and *easily*, and tilt the handle so you can just feel the blade engage the beard.

Then shave with short slanting strokes. It doesn't require any brute force to shave with a Gillette—the razor does the work.

Gillette Safety Razor, Ltd.
200 Great Portland St.
London, W., England

A. G. Micheles
53 Liteiny, Petrograd, Russia

Vedova Tosi Quirino & Figli
Via Senato, 18
Milan, Italy

Gillette Safety Razor Company
Boston Mass·U·S·A·

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Post Impressions by a Young Bride, or the Twelve Pound Commissary Ham

In Vers Libre (Tres libre)

I.

A tiny bungalow screened safely in
Under wide protecting eaves.
Dawn breaking shrilly
In the middle of the night
To the raucous notes
Of a bugle.
Sleep filled eyes
And a balky range
And soot on one's fingers,
But ultimately breakfast!
And ham
With burned brown edges
—And eggs * * *

II

Motors throbbing.
Cadets,
And lines of khaki and blue
Watchful waiting for Ida or Mary,
Or anyone of those elusive southern girls
Who come to wash and sew on.
Only they don't—
And ham for luncheon,
Plain boiled ham
With potatoes * * *

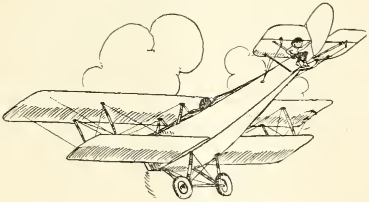
III

Flowers in the fields,
Red and blue and pink and yellow,
And dewberries.
The Red Cross meeting
And piles and miles of snowy gauze
And interesting bits
And ravellings of Post-news.
And the long white shell road home,
Hurried preparations for dinner,
And ham
Cunningly camouflaged * * *

IV.

Conversation concerning fuselages
And Hispano-Suizas
And the French Ace
And the bird that pulled an Immelman
At three hundred feet
And was confined to the post.
A stroll through the dark,
And the deep peace of a Texas evening.
Comforting sounds
The frogs chorusing
At the edge of the field.
The creak of the new boots,
And the soft glow of the little bars
On his shoulders.
The night ships, and the stars—
And romance * * *
Taps!
And a sociable bite before turning in.
Ginger ale
And ham—
Ham sandwiches!

—*Courtesy Ellington Field Tale Spins.*



The 20th Century "NIP BEHIND" or a Tail-Spin De Luxe.
—Courtesy Marvin Russell, Pacific Aero Club

The Village Blacksmith

(*Revised R.F.C. Version.*)

Under the spreading hangar roof
The sergeant-major stands;
A fierce, imposing monster he;
All quake at his commands.
And the thunder of his booming voice
Is worse than German bands!

His hair is cropped beyond recall,
His face is like a boot;
His brow is wet with thoughts of debt
Incurred when a recruit.
He looks nobody in the face
(If so, they'd have to scoot!)

He goes at midday to the mess
And sits among the swells;
Then drags defaulters by the neck
And dumps them in the cells.
While his massive fists are tightly clenched
Like those of Billy Wells!

Week in, week out, from morn till night.
You can hear him curse the day
When he started on his maiden flight
And a beastly strut gave way,
When (according to his own account)
He was foremost in the fray!

Strafing, abusing, bellowing,
Onward through life he goes,
Each morning he contrives to add
To many an A/M's woes.
Something attempted, someone "run,"
Will earn him a damaged nose!

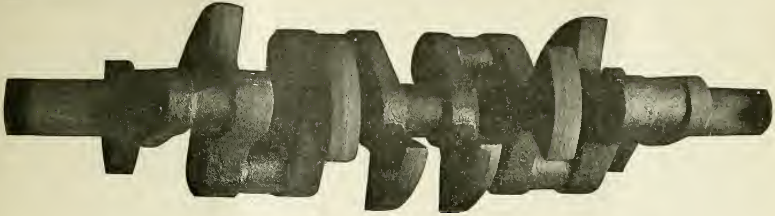
G. R. S.

Children of the Air

At play among the purple weeds,
Humming, in darts and flashes,
A dragon-fly on nectar feeds,
Then off he swiftly dashes.

Among the purple sunset mists,
Drumming, in sweeps and dashes,
A birdman wings where fancy lists,
And then away he flashes.

Margaret L. Seaman.



a counterbalanced aviation crankshaft . . . .

Patented July 10th, 1917

one of the 18 different
models we are now making
for 14 aviation motor companies . . .
reduces vibration and eliminates bearing pressure

We have shipped 63,771 Counterbalanced Crankshafts to July 24, 1918

THE PARK DROP FORGE CO. CLEVELAND, OHIO

(*Continued from page* 1059)

quantities. I have seen them work and they are satisfactory for bombing machines. Finer engines, made with much intricate and specialized parts, like a watch, cannot be made in quantities, but the Liberty motor can, which is a big advantage.

"War of the future lies in the air, for when the big commercial planes are developed they can easily be turned into fighting machines, with powerful offensive propensities. England was able to defend herself with a large navy, but it will be necessary in the future for nations to have large aerial forces.

"Battleships will be no match for the new aerial machines, which will revolutionize warfare both on land and sea. The activities of the fighting forces will be transferred to the air. Armies and navies will be unable to battle with the immense bombing machines of the future.

"The world will look to America for great developments in aviation because she has unlimited resources, while European countries are impoverished by long years of spoliation and destruction. America will manufacture large commercial machines. They will be speedy and able to carry a hundred tons instead of a thousand pounds as now."

Signor Caproni is in Paris on Government business. He expects to visit America, probably after war. His whole time is now devoted to war purposes. He is not developing commercial machines.

"Nobody is safe in being incredulous about the possibilities for development in heavier-than-air-machines," said Secretary Baker, commenting on Mr. Caproni's statement.

Navy's First Year in Planes Praised

One year ago the construction of the present naval aircraft factory in Philadelphia was authorized. Secretary Daniels has recently congratulated Naval Constructor E. G. Cosburn, U.S.N., for the year's work in these words:

"The Department desires to express its appreciation of your ability shown in organizing the naval aircraft factory to its present state of efficiency. One year ago the construction of the naval aircraft factory was authorized by the Department and you were detailed as its manager. This factory has been built in accordance with plans prepared by you, and the records shows that forms for the first flying boats were laid October 12, while the building was not completed until November 28. The first flying boat was given its successful trial flight on March 27, 1918, and since that date a steadily increasing rate of production has been observed. It is noted that the first order for fifty large flying boats has been completed and the greater part are now flying over British waters.

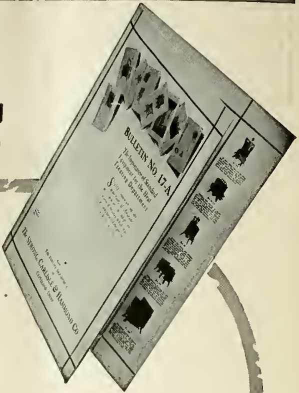
"It is believed that the creation in the space of one year of one of the largest aircraft factories in the country stands as a conspicuously successful example o the navy's preparation for war.

"The original factory had a floor space of 160,000 square feet, but an extension, which will add 55,400 square feet, is now practically completed."

How Airmen Hampered the German Drive

German prisoners are again complaining bitterly, according to the *Morning Post,* that since the present offensive began, their own airmen have given them insufficient protection from the bombing activities of the British flying officers. One referred especially to the British bombing of German troops and billets in the Bapaume area, where apparently great execution was done. This prisoner assumed—not unnaturally perhaps—that the British work in the other areas outside his personal experience had been equally deadly for his compatriots. A German officer prisoner belonging to a famous regiment stated that a few days before he was taken, a British airman dropped a bomb on an ammunition train in Wcincourt station, and that the whole train exploded. It had been carrying a large number of shells for the 36-cm. Austrian guns. As a result the guns in question were able to play but a small part in the bombardment leading up to the German attack of April 24th, for lack of ammunition. Another prisoner enlarged at length upon the remarkable number of casualties caused by British bombing airmen in the Bapaume area at the end of March and during the first half of April. This prisoner said he had seen great masses of wrecked German transport and very many dead horses killed by the British bombs. The number of killed and wounded among the troops was also very large indeed. One German aerodrome, which he named, had to be moved back seventeen miles in order to protect it from the British bombs. This was not regarded as very helpful to the German infantry.

Send for Bulletin 17C

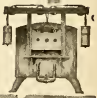

Bulletin No. 17-A
The Importance of Standard Equipment for the Heat Treating Department
The Strong, Carlisle & Hammond Co

A letter, post-card or the coupon below will bring you your copy free

IN a period such as this, when the whole nation is confronted by serious problems, no individual effort is too small which can serve the nation's interest.

Industrial problems are particularly complex. The demand for production on an unprecedented scale is hampered by a dozen opposing factors.

The Bulletin pictured here is printed in the effort to show each factory manager how an expensive practice has arisen in heat-treating departments which can now be corrected. To remedy the practice will result in decreasing the expenses of the individual concern, while at the same time increasing the nation's output. In other words, it is equally important from the motives of profit or patriotism.



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ITHACA, N.Y. U.S.A.

Contractors to U.S. Government

(*Continued from page* 1075)

"Joy" Flying Forbidden

London.—The numerous collisions in the air, resulting in fatalities has caused an order forbidding any officer to fly except on duty and after production of a certificate from the colonel. This will put an end to the great number of joy flights which infantry subalterns enjoyed at the hangars of their flying friends, often resulting in accidents.

Same Here

Lieut. Commander T. H. Newberry, aide to Rear Admiral Usher, commandant of the Third Naval District, has intimated that prompt action would be taken to stop the reckless flying of student naval aviators, which has caused widespread complaint among cottagers along Great South Bay.

Build 15-Ton Planes Here

Portland, Ore.—Outlining the nation's aircraft program after an inspection tour, which took him through the spruce districts of the Northwest, John D. Ryan, Federal Director of Aircraft Production, announced that the United States now was producing aeroplanes weighing fifteen tons and equipped with four motors of the Liberty type.

Mr. Ryan said the larger types of bombing planes would be manufactured in the United States, but that the smaller scouting and battle planes would continue to be manufactured overseas.

Production of the Liberty motor is increasng every month, Mr. Ryan said. Four hundred were turned out in July and the estimates place the August production at five hundred machines. He said the "peak of production" probably would be reached in November or December. Orders have been placed for fifty thousand motors, he said, 27,500 of which are to be turned over to other governments.

When Insects Take to Aviation

According to Lieutenant Depret-Bixio of the French Army, who is a naturalist as well as a flying man, many insects follow captive balloons in their ascent. He has seen flies go as high as 2,970 feet, after which they die. Grasshoppers cling to the basket of the balloon until the air becomes too rarified for them, when they let go and fall. He says the swallows have a glorious time catching these insects.

Brilliant Aeroplane Flare is Perfected to Aid U. S. Flyers in Night Bombing Operations

Maj. Gen. C. C. Williams, Chief of Ordnance, authorizes the following:

An aeroplane flare with a brilliancy equalling that of 400,000 candles has been perfected. When hanging from its parachute over a German munition plant it lights up an area so brightly than an airman, thousands of feet in the air, can select any building he is directed to make a target for his aerial bomb, and, it may be added, American aviators are becoming so expert in bombing that they can usually hit the target at which they shoot.

In every European city within the zone of aerial raiding operations, the rule is rigidly enforced against the burning of lights in any building that might possibly be used as a target. Therefore, the airman must be able to supply his own means of locating the object of his attack.

When orders are received to bomb, say a particular railroad center, the aviator proceeds very much in the same manner as does the captain of a vessel. The cities and their environs are charted and the night-flyer proceeds by compass, due allowance, of course, being made for atmospheric conditions. He is also frequently aided by prominent markings, such as the reflection of moonlight from a river.

Having reached the particular district sought, he must locate the particular object of his attack from his position, which may be 5,000 or 10,000 feet, or even higher, above the earth. Equipped with the aeroplane flare, the aviator pulls a lever and releases it. As it drops, the resistance offered by the air sets the fuse mechanism in operation. The result is the emission of a powerful light of from 300,000 to 400,000 candlepower, which completely illuminates the terrain below. The amount of light given is equal to that of a battery of from 150 to 175 street arc lamps, or of from 15,000 to 17,500 ordinary incandescent lamp bulbs such as are used in the home.

As soon as the flare gets into operation, a huge parachute made of the best quality of silk opens and holds the brilliant light in suspension in the air for a sufficient time to allow the aviator to select his objective or target. Having located the factory, railroad depot, ammunition dump, hangars, munition plant, or whatever the target may be, the aviator drops the bomb and proceeds on his way.

The height at which an aviator flies when attacking depends, of course, on surrounding conditions. If the enemy is aware of his presence and is preparing for attack, he must keep up and out of range of antiaircraft guns. An idea of the effective light thrown on the ground by this flare may be gained from the fact that, when suspended at a height of from 1,500 to 2,000 feet it will clearly light a circular area one and a half miles in diameter. When on a bombing raid, an aviator seldom flies at such a low height, more generally keeping 5,000 feet or more above ground, in which case the effectively lighted area is, of course, diminished.

Planes Hover Continually Over the American Capital

Washington.—Flying has become a daily event here with the construction of a large hangar at Potomac Park housing several Curtiss J-N 4 aeroplanes. A DeHaviland aeroplane equipped with two Liberty engines has just been added, and two Spads are expected shortly. In addition there is an Avro aeroplane here, shipped from England, built by A. V. Roe & Co. and equipped with a 100-h.p. Gnome engine. The Avro plane is the property of the British Mission and is used exclusively by General C. F. Lee, who heads the British Aeronautical Mission in this country. General Lee was practically the first flier to exhibit the maple leaf drop, the "Immelman" turn, the spiral fall and the other "stunts" used at the front, in Washington. His exhibits have been watched with great interest by President Wilson and the various War Department officials.

Many fliers are stationed in the aviation section in Washington at desk work. In order to maintain their records and to secure the 25 per cent extra monthly pay allotment awarded to fliers provided they are in the air a certain number of hours each month, these men make frequent use of the Curtiss J-N 4 planes. Several may be seen flying each day at all hours, over the State, War and Navy buildings, the White House and the city proper.

Aviation Expert in Washington

Washington. — Lieutenant-Colonel Sir Henry Fowler, in charge of the Sectional Components of Aircraft, and Assistant Director General of Aircraft Production of the British Ministry of Munitions, has arrived in this country on a special mission concerning aeroplanes.

Personal Paragraph

Julian S. Friede will leave shortly for Toronto to become a cadet in the Canadian Royal Air Force. For two years Mr. Friede has been an important factor in the engineering department of the Paige-Detroit Motor Car Co., where his chief work has been body designing. In his new military efforts he will specialize on radio work and flying.

THIS AEROPLANE STRUTT

Was made on a

WHITNEY SHAPER

No trick to do it

Do you want to know how?

Write

Baxter D. Whitney & Son

Winchendon - - Mass.

Direct Motor-Driven Double Spindle Shaper

(Continued from page 1080)

Schleifer, Elmer Otto	SLA; SMM
Sherrick, Leon Danfreth	SLA; KST
Spencer, George S	DAP
Slocum, Winfield S., Jr	CJS
Schank, Harry Edward	SLA; KST
Smith, Wayne G	DMA; PFO; Note 1
Smith, James Roy	SLA; PFO
Seaton, John W	SMM
Shepard, Frederick B	SMM
Squires, Paul R	SMM
Smith, Hart G	SLA; LDT
Spofford, Benjamin Dwight	SLA; KST
Sherry, Bertram J	FLR

T

Thompson, Adam Gentles	SLA; DAP
Thomson, William White	SLA; CFT
Taylor, Richard F	DIK
Taylor, Arthur W	EOT
Tanner, Olav J	DIK
Thrig, Howard K	DIK
Tinsley, George C	SMM
Treat, Verne E	TFT
Tolles, Raymond P	TFT
Tuska, Clarence D	LDT
Taylor, Russell Louis	SLA; TFT
Tufts, Russell Daniel	SLA; KST
Treleaven, Peter W	KST
Trahold, Arthur R	DMA
Thomas, Ernest William	SLA; CGC
Thompson, Neal	DMA
Tanner, Olav J	CFT
Thompson, John F	LHV
Taylor, John A	LHV

U

Utley, Charles B	TFT

V

Vaile, Rawson	FLA; DAP
Van Arsdale, Maurice William	SLA; CFT
Vincent, John H	EOT
Vickery, James C	SMM
Von Allmen, Paul J	TFT
Verheyden, Edward J	FRF
Vaughn, Guy Otis	SLA; CFT
Vickers, Alhert Henry	SLA; CGC
Van Veghten, Theodore S	FRF

W

Whitaker, Joseph H	FRF
White, Willie C	FRF
Wilbourn, Arthur E	WDM
Wilkes, William Douglas	SLA; DAP
Wood, Ivan D	GLC
Winants, Garrett E	EOT
Wellford, Armistead L	SMM
Walker, Stephen P	TFT
Wiegmann, John P	TFT
Williams, Roger Q	SLA; TFT
Wolfe, Kenneth B	FRF
Warren, Edward W	Note 3
Wade, Don D	DIK
Wooten, Ralph H	DIK
Wright, Harry Johnson	SLA; CFT
Wagoner, George A	DIK
Wood, Raymond	SLA; PFO
Whitehead, Cecil F	DMA
Wrigley, Paul Pickering	SLA; GLC
Wright, John Brandon	SLA; KST
Walton, Richard S	FRF
Williams, Errett	DIK
Woolsey, Clinton F	DIK
Wall, John E	FRF
Wallis, Edmund C	LHV
Wren, Samuel M	LHV
Williams, Raymond B	EOT
Wirgman, Stewart L	DIK
Washhurn, William C	CGC
Wagner, Ralph	SMM
Welsh, Floyd E	Note 9
Wacaser, Frank E	TFT

Y

Young, Bentley	EOT
Young, Crawford	DIK
Yeomans, William Edward	EOT
Yerkes, Lawrence A	DIK

Z

Zalihra, George Charles	SLR; DMA
Zimmer, Harry M	DIK

In Air More Than Thirty Hours

The Navy Department has received a dispatch stating that Ensign P. J. Barnes, United States Naval Reserve Flying Corps operating in European waters, has estahlished a new endurance record for the "Blimp" type of airship by remaining in the air thirty hours and thirty minutes.

Learn Night Flying

Ellington Field, Tex.—A new course in advanced night flying has heen inaugurated to simulate conditions that the pilot will encounter when he crosses the lines after dark. A powerful searchlight has heen installed.

Air Advantage Will Blind Hun Says Masefield

"Our success in the war depends upon an overwhelming superiority in aeroplanes," said John Masefield, famous English poet who visited Kelly Field recently. "This will hlind the Germans and prevent their ohtaining knowledge of the movement of our troops and material."

The poet delivered three addresses to the men of Kelly Field, speaking at Y. M. C. A. 160, and at the Aviation Clubs in the First Training Brigade and Flying Department.

'Plane Mishaps Fault of Fliers, Says Kenly

Washington.—General W. L. Kenly, chief of the Department of Military Aeronautics, informed Representative Olney, of Massachusetts, on July 15th that accidents at the several flying fields where cadets are in training were in the main caused by carelessness and disobedience of orders. General Kenly stated in a written communication that everything possible was being done by the army authorities to minimize the dangers to cadets and to reduce the numher of accidents.

Skilled Mechanics May Be Inducted for Brooks Field

A numher of skilled mechanics are needed at Brook's Field, San Antonio, Tex. Men in the draft age who desire to enlist in the Air Service may do so hy interviewing the commanding officer in Brooks Field and then arranging with their local draft boards to be inducted into the service. Men, not of the draft age, may also enlist at Brooks Field which has special permission from the War Department to accept the first properly qualified men who apply.

The vacancies have been created by the recent transfer of a number of men not sufficiently qualified as mechanics. Engine repair men, magneto experts, machinists, sailmakers and blacksmiths are especially needed, as well as men skilled in driving and repairing automobiles. A number of stenographers are also needed for work in the clerical force. Skilled men may obtain the rank of Master Signal Electrician at $81 per month, while the best men may qualify for commissions as reserve military aviators.—Kelly Field *Eagle.*

Name New Aviation Field

The landing field two miles south of Austin, Tex., has been named Penn Landing Field in honor of Cadet Eugene D. Penn who was killed while flying in Italy on May 21 last.

Change Work Hours of Flying Department

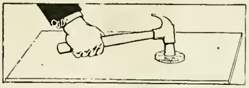
The work hours of the men in the shops of the Kelly Field Flying Department have again heen changed, at the request of the men themselves, following the report of the weather bureau that the hottest hours of the day are from 3 until 5 o'clock in the afternoon.

The hours are now from 6 a. m. until 4 p. m. Originally, they were worked from 7 a. m. until 5 p. m. Under the schedule which existed hefore the present hours became effective, they worked even later, but with a longer rest at noon.

RESISTAL

Is the Only Guaranteed Non-shatterable Safety Glass in Aviators' Goggles

Many other goggles claim to have lenses of Safety Glass, but before trusting your life to the airplane, just put them to the hammer test.



TEST NO. 1—Break any piece of any other kind of glass with a single hammer-blow. Note result. Some of the glass particles may remain in the rim but what happens to your eyes from the particles that fly?

TEST NO. 2—Hit a RESISTAL lens a single blow in the same manner with same hammer but be sure you hit a harder blow this time. Note result. The glass will crack but not a single dust particle, much less a sliver, will fly. Your eyes are safe behind RESISTAL.

We will send you free unmounted pieces of RESISTAL lenses to hammer and crack at your pleasure. The U. S. Bureau of Standards has conducted two exhaustive tests of non-shatterable glass. As a result, the U. S. Army and U. S. Navy use aviator goggles with RESISTAL lenses. Write for these reports.

EYETECTS are the only goggles with lenses of RESISTAL

They have already proven, in hundreds of cases, their life-saving value and there being no substitute, your eyes are safe only when your goggles are RESISTAL EYETECTS; any other kind are dangerous.

RESISTAL S.&B.N.Y.

Look for this trade mark on your goggle lenses

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Sole Manufacturers

438 Broadway, New York City

Send for Booklet on RESISTAL EYETECTS telling of many aviators' experiences

2 styles of RESISTAL EYETECTS for aviators

Week End Flights Made By Officers

Eight aviators carrying passengers made week-end trips from Kelly Field. Three visited Corpus Christi, leaving Friday morning and returning late Saturday night. Lieuts. W. C. Dorset, F. F. Watson, and J. L. Whitney were the men who made the trip to the sea coast.

Lieuts. George A. Cary and N. F. Goodyear visited Victoria, and Lieut. H. T. Highley flew to Cuero. Lieut. H. C. Roberts journeyed to Madisonville, and Lieut. E. J. McCarthy made a flight to Camp Stanley.

Revolutionists in German Army Destroy Aerodrome

London.—The destruction by fire of a new German aerodrome, with twenty-two aeroplanes, near Nivelles, is attributed to the work of German revolutionists in the army, says an Exchange Telegraph despatch from Amsterdam on July 17th. Nivelles is seventeen miles south of Brussels.

Ten Belgians and two German non-commissioned officers have been arrested.

The day before the fire, adds the despatch, a secret meeting occurred in a canteen at Nivelles, where the scheme for the destruction of the aerodrome was discussed.

Italian Aeronautic Mission Opened

On July 1, 1918, an Italian Military Mission for Aeronautics in the United States was established under the leadership of Capt. Giuseppe Bevione, member of the Chamber of Deputies, with offices at 1829 I Street, N. W., Washington, D. C.

All matters pertaining to Italian Military Aviation in this country will be referred to this mission.

First 'Plane Business Established in Brazil

Washington.—The first aeroplane factory in South America designed to build airships commercially has been established at Sao Paulo, Brazil. The first aircraft was built by Sebastian Carani, and is reported a success.

Aeroplane and Balloon for the Panama Canal

In order to guard the Panama Canal from attack from the air as well as from the land and the sea, it has been decided to place an aero coast defense squadron and a balloon coast defense company in that military department near the Atlantic and Pacific coasts.

A board of officers, consisting of Maj. Walter W. Wynne, N. A., and First Lieuts. Ernest R. Burnlight and Thomas R. Evans, S. R. C., has been appointed to select the most advantageous site for the location of those units.

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By sending one letter a day by aeropost you can contribute directly to increasing the opportunities to train military aviators in flying across country and by dead reckoning, which is the training required to hunt U-boats and to bomb cities behind the German lines.

If a hundred thousand people in the forty-eight States should decide to send a letter a day by aero mail the result would permit extending the aeropost service east, west and south and provide continuous training for a minimum of 300 aviators in flying across country and navigating by dead reckoning.

Few people seem to realize that letters can be sent to any city south of Washington by aeropost from New York, making much quicker connection with the regular postal routes and arriving at their destination many hours before mail sent all the way by rail. The same is true of letters sent via Philadelphia to points in the West and also from Washington to New York to points in New England.

Aeroplane mail received at the following postal stations in New York City up to ten minutes before the hours of leaving named below will be delivered in Philadelphia and Washington on the same day as indicated.

	A. M.		A. M.		A. M.		A. M.
G. P. O.	10.50	K	10.25	U	10.20	Hud. Term	10.45
A	10.35	L	10.20	V	10.30	M. Sq.	10.30
B	9.47	M	9.52	W	10.25	Penn Ter.	11.15
C	10.35	N	10.30	X	8.49	Times	10.40
D	10.20	O	10.35	Y	10.30	Tomp	9.40
F	10.30	P	10.20	College	10.05	Tremont	8.06
G	10.35	R	8.43	Fox	8.26	Wall	10.20
H	10.25	S	9.53	G. Cent.	10.55	Wash.	9.46
I	10.20	T	8.35	H. G.	10.00	W. F.	8.15
J	10.20						

If you receive business letters from Washington or Philadelphia in the morning, at the beginning of a business day, you can answer them immediately and by mailing the letter at any of the stations given in the accompanying table before the time of closing the mail at that station, your letter will be delivered in Washington or Philadelphia in time to allow business men or government officials to answer you the same afternoon and you will receive the answer the following morning.

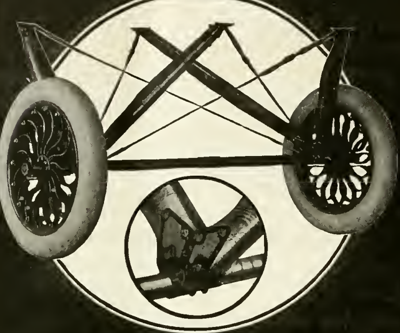
The aeropost will do away with sending special couriers to deliver important mail or legal papers, plans, specifications, etc. The postal authorities can arrange to make delivery of mail immediately upon its arrival at Belmont Park to the firm's representatives, if they so desire.

By adding an aerial mail route from Washington to Chicago, by way of Wheeling, W. Va., and Lima, Ohio, one day can be saved in the delivery of mail in the Middle West, and a similar saving can be effected in the reverse direction. Letters mailed in the West and South, bearing an aeroplane stamp will reach their destination almost two days ahead of the regular mail matter. The time of mail delivery will be cut down further by the establishing of routes from New York to Boston, and from Philadelphia to Pittsburg, Cleveland and Detroit, connecting the industrial centres of the country.

These routes will be added as soon as the number of aeropost letters is large enough to justify the step. You can make it large by sending one letter a day by aeropost.

The cost for this service by aeroplane at present is only three cents (3c) an ounce. Ten cents (10c) is added for special delivery service, and three cents (3c) regular postage, making sixteen cents (16c) an ounce in all, and with a greater volume of mail it is possible that this rate may be reduced.

The performance of the aero mail carriers between New York and Washington has been such as to warrant the hearty co-operation of all business men and firms, and especially those interested in aviation.



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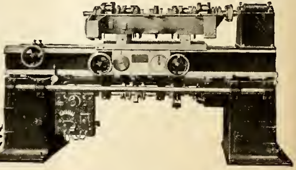

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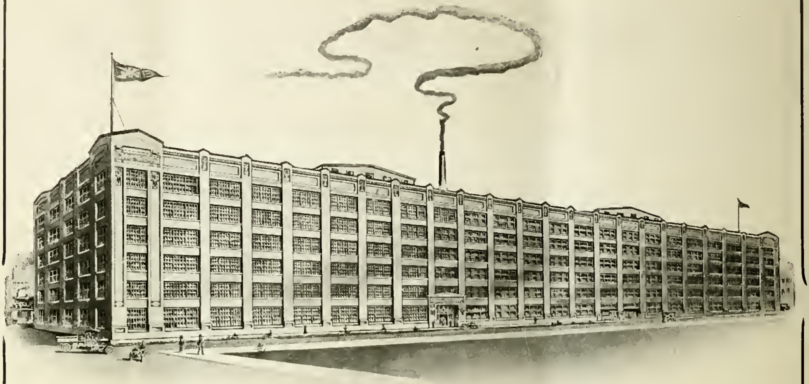

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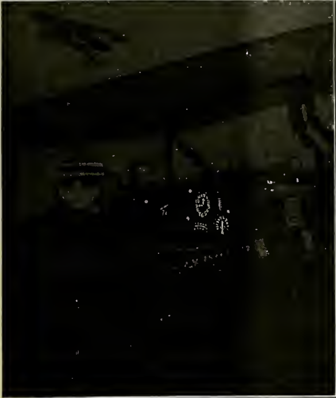

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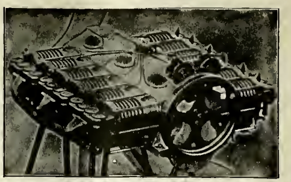

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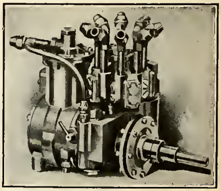

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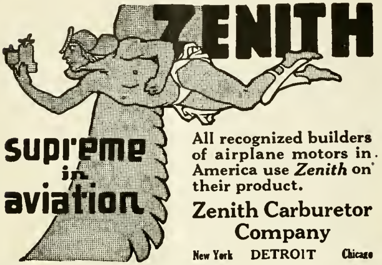

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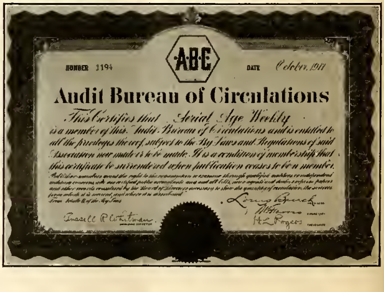

ABC

NUMBER 3194 DATE October, 1917

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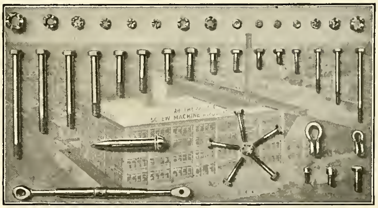

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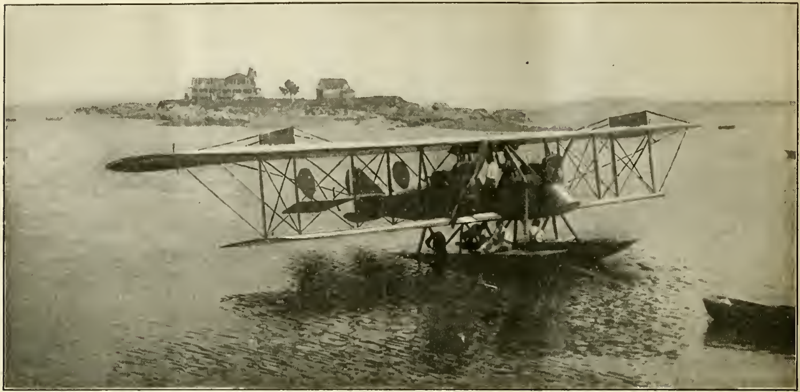

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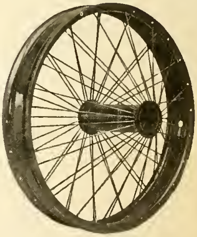

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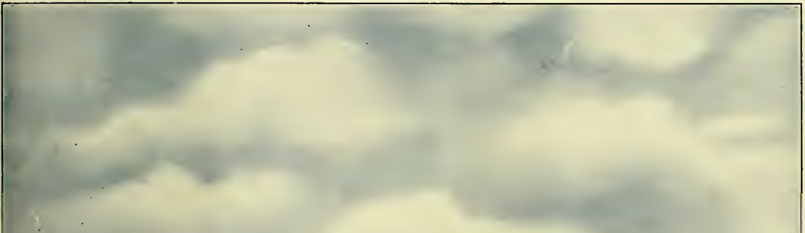

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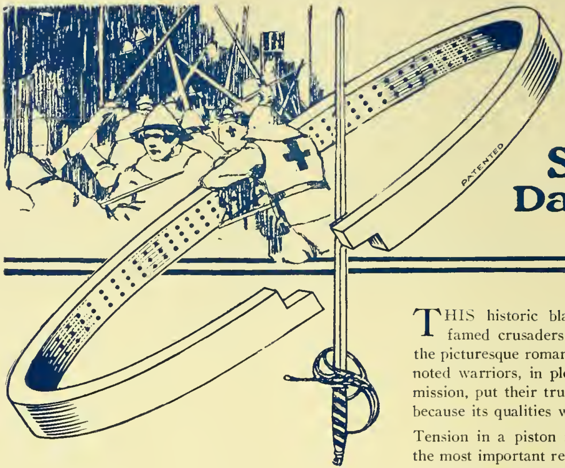

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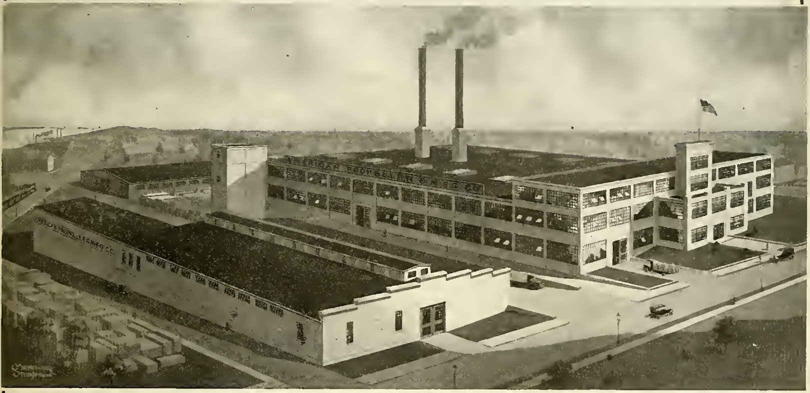
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AERIAL AGE
WEEKLY

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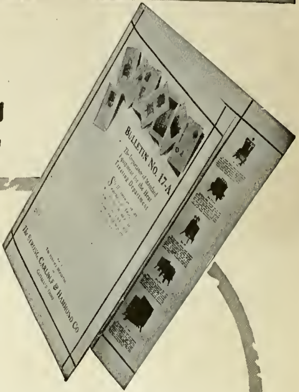

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IN a period such as this, when the whole nation is confronted by serious problems, no individual effort is too small which can serve the nation's interest.

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The Bulletin pictured here is printed in the effort to show each factory manager how an expensive practice has arisen in heat-treating departments which can now be corrected. To remedy the practice will result in decreasing the expenses of the individual concern, while at the same time increasing the nation's output. In other words, it is equally important from the motives of profit or patriotism.

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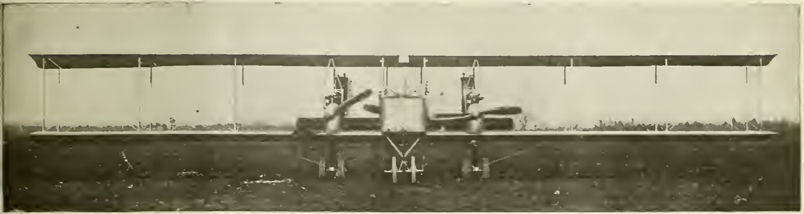

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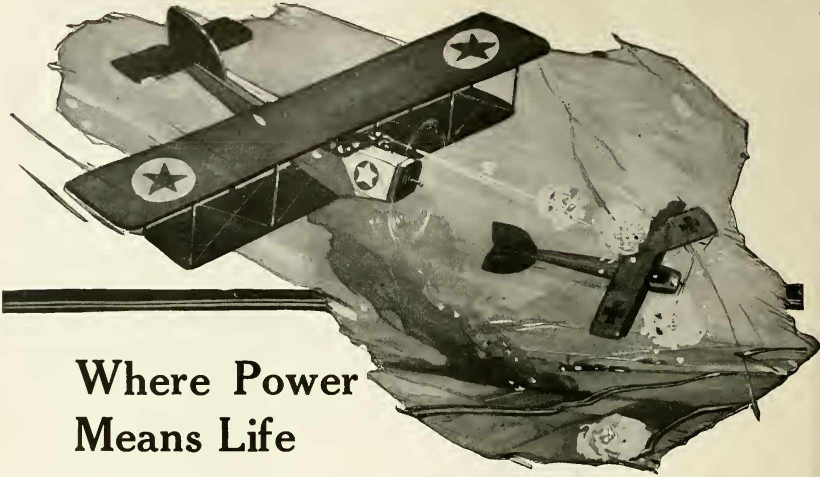

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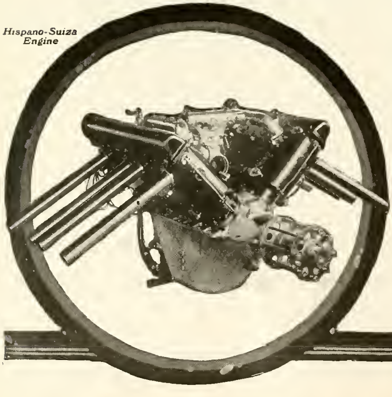

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WHAT CAN THE AERONAUTIC INDUSTRY LOOK FORWARD TO?

By HENRY WOODHOUSE

WHAT is the future of aeronautics—what can the aeronautic industry look forward to?

This is a question that comes to us often these days. Scores of firms have taken up aeronautic work and most of them have either lost or given up all other business. Therefore they inquire regarding the future of aeronautics.

The day of the inauguration of the first permanent aerial mail line, with aeroplanes owned and operated by the Post Office, is an appropriate time to answer this query. This event marks the advent of the aerial age, an age which may be even greater than the steamship age and the railroad age.

We have answered this query a great many times each year since 1910, and, somehow, our answers have always been correct, although they appeared extremely enthusiastic at the time they were made. A great many millions were invested on forecasts which we made, and nobody has lost in following our estimates.

Forecasting the Future

(1) The aeronautic situation today is exactly as it was two years ago, but the proportions are very much greater. Two years ago at this time there were not as many aeroplanes in the army and in construction as there are today in the Aerial Mail Service.

(2) Two years ago at this time General Pershing was waiting impatiently for half a dozen aeroplanes for the Mexican campaign, and the Army did not have as many as 17 aeroplanes, which is the number of machines being operated by the Post Office for carrying mail today.

(3) Those of us who went before Congress and told Congress that the United States should have 5,000 aeroplanes were considered extremists. Nevertheless eighteen months later the American public grew impatient and indignant because only about 10,000 aeroplanes and motors have been produced in the past fourteen months. The increase in number of aircraft employed in the war will be so great by next year that the production of 100,000 aeroplanes a year will be considered modest.

To answer the query regarding the future of the aeronautic industry we must look into the future just as we looked into the future two years ago, or six and eight years ago, and try to estimate the changes which may be expected in the world's affairs from the present extraordinary situation and the possible development in size and employment of aeroplanes.

(4) The duration of the war is the first thing to be considered. A war of such magnitude as the present war cannot end like a summer shower. It is more likely to smoulder on for years like a forest fire, because even if Germany should propose peace under conditions entirely favorable to the Allies, it would not be wise to discontinue the work of preparedness or to stop the manufacturing of war materials, because our enemy is a treacherous enemy and cannot be trusted. Therefore the manufacturing of war materials may be expected to continue for probably a year after the negotiations for peace begin.

Army Aeros for Civil Uses

Supposing the war lasts another two years—and that seems to be the absolute minimum. Considered from the standpoint of two years hence, and with two years in which to develop commercial aeronautics and establish aerial mail lines across the continent, across the Atlantic, in South and Central America, Canada, Australia and other countries where aerial transportation will solve some of the great difficult problems of transportation, we can expect to be able to use 50 per cent of the entire output of aircraft for commercial purposes. This may be true if every effort is made in the meantime, beginning right away, to develop the aerial mail service.

If the war lasts three years longer, and every effort is made in developing the aerial mail service, when the war comes to an end not less than 70 per cent of the aeroplanes being built today can be used for the maintenance of our national defences and the aerial mail and express service.

If the war lasts four years and every effort is made, the entire output of our factories can be utilized entirely for transportation and maintenance of our national defences.

(5) Just as those of us who worked for the building of our air forces pointed out in 1914, 1915, 1916 and 1917, that a substantial aerial mail service would build up a powerful reserve of trained aviators and develop valuable aircraft manufacturing facilities which would be available for national defence in case of need, we must today recommond this same measure to protect the welfare of this country and safeguard civilization.

(6) It is hardly necessary for me to point out that now that we have aeroplanes capable of lifting fifteen tons and going at a speed of about 100 miles per hour, and the Air Service comprises over 10,000 aviators, and the non-flying personnel numbers over 100,000 men, the general application of aircraft for transportation is to come fast.

(7) Only a few days ago a despatch quoted Mr. John D. Ryan, the energetic Director of Aircraft Production, as saying that there is a type of aeroplane under construction which is to be equipped with four Liberty motors, or 1750 horsepower. This air cruiser will probably be capable of lifting close to 40,000 pounds, and the limit in size has by no means been reached. A 5,000 horse-power aeroplane may cleave the air before we are a year older.

To Cross the Atlantic

Likewise delivery of mail across the Atlantic and across the continent may be as common next year at this time as the delivery of mail by aeroplane on the New York-Philadelphia-Washington route is today. The mail will be much heavier over long distances, because then the aeroplane will make it possible to make deliveries a number of days sooner.

(8) The fact that the radius of flights of aeroplanes is extending to 2,000 miles, and may extend to 4,000 miles within two years, brings hope for closer understanding between nations after the war, due to faster transportation and intercommunication, but also brings the menace of disaster which may befall to our generation if the control of the air should be gained by a troublesome country like Germany.

As a matter of fact, it is known that Germany is planning extensive aerial mail, express and passenger transportation.

(9) Large aeroplanes capable of flying across the Atlantic will revolutionize the world economically and sociologically by bringing nations into closer relationships and eliminating frontiers; but they will also make it possible for a troublesome country like Germany to build an enormous reserve of aircraft, obviously entirely for aerial transportation, but which

may be turned into terrible weapons by simply replacing the cargo of mail with loads of explosives to drop without warning on some unsuspecting country.

(10) As a matter of fact, it is known that Germany is planning extensive aerial mail, express and passenger transportation lines, to employ the output of her aircraft factories after the war. Germany's plans are extensive enough to employ tens of thousands of large aircraft. This would give her a reserve fleet large enough to blow England, France or Italy and cities on the American continent off the map overnight. As was brought out in the House of Commons by Lord Montague, aircraft can be turned from vehicles of transportation to war machines by the simple process of substituting bombs as cargo. A nation that overlooks this fact may pay dearly for its oversight.

(11) We all hope, of course, that some agreement may be reached between the nations which will guarantee against such a horror as the bombing of a nation out of existence overnight by another nation having tens of thousands of aeroplanes. But the present war has shown that hope does not save nations from the outrages of aggressors. As a matter of fact, Germany's first air raids on Belgium, France and Great Britain were conducted by Zeppelins, which were employed for passenger carrying before the war. So while keeping our hearts in the right place, the Allies must be ready to protect the rights of Humanity and the Cause of Civilization.

(12) Anything that is done to bring into use thousands of aircraft for civic purposes is a contribution towards placing the United States and the Allies in the position of the porcupine, which goes about its peaceful pursuits, harms no one, but is ever ready to defend itself. The Post Office can use thousands of aeroplanes for the Aerial Mail Service—which will form a valuable reserve for national defense. In assisting the development of the Aerial Mail Service we are assisting the development of future aerial reserves as well.

(13) Few people realize that aerial mail and express service actually means economy in dollars and cents. The same people who today spend from fifty cents to three dollars for telegrams and more than that for cables will soon be using the Aerial Mail Service extensively because it makes it possible for them to send a written message just as fast by aeroplane, but at only a fraction of the cost of telegrams and cables. Those of us who have been using the Aerial Mail Service between New York and Washington find that it is quicker and much more efficient than the telegraph, principally because it does not take longer, and it carries a much longer message written in our office as a letter, and can carry at the same time other papers, which, of course, could not be sent by telegraph or cable.

(14) The fact that the aerial mail is just as quick as the telegraph and cable, but is more economical and efficient, insures its future. The fact that it will develop extensive reserves and manufacturing facilities makes it a valuable asset to the cause of the Allies and civilization.

The Post Office has plans for hundreds of aerial mail lines, each of which may in future have aeroplanes running day and night, and starting every half hour. As soon as the transatlantic aeroplanes come into being there will be transatlantic mail lines to carry mail in every direction of the globe, and for each line there will probably be two or more huge aeroplanes starting every half hour, making a minimum total of forty-eight large air liners required for each air line. We know that a hundred of these large air liners will be the equivalent of a thousand of the present size aeroplanes; therefore the amount of aeronautic business will be enormous.

One hundred thousand large aeroplanes will not appear a large number when they are employed for aerial transportation, nor will ten thousand pleasure aircraft, but they will give the aeronautic industry ten times the work it has to do today.

THE WAR MEDAL AND DIPLOMA OF THE AERO CLUB OF AMERICA

THE Aero Club of America has had a special war medal struck in Paris, designed by the famous medalist and sculptor, Pierre Roche, recently chosen by the French Government one of the four artists to compete for the design of the medal to be established by the Government symbolizing the entrance to the United States into this war.

The medal itself is very beautiful and expressive, having on one side of it an allegorical figure representing the tenth muse—The Muse of the Air—with an inscription in Latin, "Coeli Colis Stellarum Corona", which translated means, "To the Heroes of the Skies, a Crown of Stars". There are forty-eight stars representing the States; thirteen stars representing the original colonies, form the Crown.

The other side of the medal contains the seal of the Aero Club of America, with entwined laurel and the inscription "Honor and Merit", which explains the purpose for which it is awarded. The name of the recipient will be stamped on a gold ribbon indicated on the medal, and underneath is the date 1917, the year of the entry of the United States into this war.

Accompanying the medal is a handsome diploma executed by Pierre Fritel, showing the spirit of aviation, protected by the shield of Medusa, coming to the rescue of outraged Justice, and attacking, with a flaming sword, three snakes about to strike an innocent mother and her children, which a noble figure of Justice is endeavoring to shield.

This medal and diploma have been awarded by the Aero Club of America, acting through their Foreign Service Committee, of which Ambassador Sharp is the Honorary Chairman, to the following aviators representing the United States, France, Great Britain, Italy and Belgium.

United States

Major Raoul Lufbery, Corporal L. Norman Barclay, Corporal Julian C. Biddle, Corporal Andrew Courtney Campbell, Corporal Oliver M. Chadwick, Lieutenant Victor E. Chapman, Sergeant Edmund G. Genet, Sergeant Ronald Hoskier, Sergeant James R. McConnell, Sergeant Douglas McMonagle, Lieutenant Norman Prince, Sub-Lieutenant Kiffen Yates Rockwell, Corporal Stuart Walcott, Major William Thaw, Sergeant Frank L. Baylies, First Lieutenant David E. Putnam.

France

Captain Georges Guynemer, Sub-Lieutenant René Dorme, Adjutant Maxime Lenoir, Lieutenant Jean Chaput, Lieutenant Charles Nungesser, Lieutenant Roland G. Garros, Lieutenant René Fonck, Captain Alfred Herteaux, Lieutenant Georges Madon, Captain Albert Leon Daullin, Captain Armand Pinsard, Sub-Lieutenant Guerin, Sub-Lieutenant Maurice Boyau, Sub-Lieuteant Omer Demeuldre.

Great Britain

Captain Albert Ball, Captain Philip Fletcher Fullard, Major William Avery Bishop, Major Edward Mannock, Major James B. McCudden, Captain Roderic S. Dallas, Captain Collett.

Italy

Major Francesco Barracca, Lieutenant Olivari, Colonel Piccio, Lieutenant Giulio Barachini, Captain Prince Ruffo di Calabria of Naples.

Belgium

Lieutenant Thieffry, Lieutenant Willy Coppens.

Aero Club Receives Medal

The Aero Club of America has received a copy of the Gold Medal awarded by the Aero Club of France to aviators who have distinguished themselves in military service. This medal is a very beautiful work of art, which shows the successful achievement of flight represented by a beautiful figure seated among experimental parts and finally seeing the Beacon Light of Inspiration while the figure of a dirigible balloon is floating over the horizon.

On the reverse of the medal is a winged figure awarding a palm which signifies honor and glory to the name of the one to whom the medal is awarded.

Accompanying the medal is a plaquette in silver, given to men who excel in the operation of machine guns, and bomb dropping and in evolutions at the schools, preparatory for actual military service. Upon one side is a beautiful executed battleplane diving upon an enemy machine and in the sky is the inscription "Pro Patria". Upon the reverse is shown a bombardment machine passing over a village where fires and smoke can be seen, started by the bombs which have evidently just been released.

THE NEWS OF THE WEEK

General Term "Air Service" to Designate Two Bureaus

The War Department authorizes the following:

In a communication received at the offices of Maj. Gen. W. L. Kenley and Mr. John D. Ryan, from the Adjutant General's Office, it is stated that hereafter Air Service will be the general term, including the Division of Military Aeronautics and the Bureau of Aircraft Production.

The officers and enlisted men of the Division of Military Aeronautics and those serving in the Bureau of Aircraft Production shall be known as member of the Air Service, Military Aeronautics, and Aircraft Production, respectively.

The chief of the Bureau of Aircraft Production will hereafter be addressed as the Director of Aircraft Production, and the chief of the Division of Military Aeronautics, as the Director of Military Aeronautics.

Another Training School for U. S. Balloon Pilots

Secretary Daniels announced that the Navy contemplates establishing an additional training school for balloon pilots. This school will probably be located at some point east of the Mississippi and south of the Ohio River, and it is hoped that suitable quarters for the personnel can be secured at some school, university, or country club.

In addition to available buildings, a field will be necessary to carry on the outdoor work. It is also essential that there be good transportation facilities at the point selected.

New Air Service Field Opened at Jackson, S. C.

The War Department authorizes the following statement from the Division of Military Aeronautics:

Emerson Field, a new Air Service flying field at Jackson, S. C., was opened on August 1. It is named in memory of Lieut. William Emerson, Field Artillery, who was the first artillery officer killed while serving with an American aero squadron at the front.

The field, which was authorized on May 2, is to operate in conjunction with artillery, and for this purpose includes both aeroplanes and balloons.

At present there are about 450 officers, including pilots, and 350 men stationed at Emerson Field.

Naval Aviation Section Wants Carpenters' Mates

Experienced carpenters and cabinetmakers are desired by the navy as carpenters' mates, aviation service, it is announced by the officer in charge of local recruiting headquarters.

As fast as applicants are enrolled in this branch of the service they will be assigned to the receiving ship at Charleston, S. C. Desirable ratings may be obtained by those who have the necessary qualifications, officials stated.

Belgian Ace Gets 24 Foe Aircraft in Lone Battles

Dispatches received by the Belgian legation give the first official accounts of the recent daring exploits of the "ace of aces." Coppens has been awarded the Order of the Crown and the cross of the Knight of the Order of Leopold for bringing down twenty-one German war balloons in three months.

The last successful encounter was made with German balloons on July 22, when the lieutenant succeeded in destroying three enemy balloons in five minutes.

Lieutenant Arthur J. Coyle, Flight Commander First Aero Squadron, U. S. A., to whom has just been awarded the French War Cross for having fought off three German Combat planes while his observer photographed enemy lines northwest of Toul

3,000-Mile Flight for 22 War Planes

What promises to be the greatest aeroplane cross-country flight ever made will begin in Cincinnati on Aug. 14, when a squadron of twenty-two American and British planes, in charge of Major C. K. Rhinehardt of the First Provisional Wing, U. S. A., and Brig. Gen. Lee of the British Royal Flying Corps, will fly 3,000 miles, stopping at fourteen cities. The trip has been arranged by the Division of Military Aeronautics, assisted by a sub-committee of the Committee on Public Information. The purpose of the flight is to give the people of the Central States a better idea of the progress of aviation than they have heretofore been able to get, and also to give a thorough training to the aviators who will probably be selected to make the proposed flight across the Atlantic.

Britain's Air Force Shows Huge Growth

Figures showing the marvelous development of the British air force in four years of war have been supplied by the New York "Times" from a well informed source. Four years ago the British possessed considerably fewer than a hundred aeroplanes. Now the Royal Air Force alone destroys in an average week a considerably larger number of enemy aeroplanes than Britain possessed when the war began.

In June last the number of enemy aircraft brought down, which means destroyed, by the British alone, was 314, while the number driven down out of control was 168. As against that total of 482 enemy machines destroyed or driven down, 168 British machines were reported missing.

During one month British airmen fired at ground targets 915,308 rounds of machine-gun ammunition. During this same month they dropped 853 tons of bombs over different military objectives and made no fewer than seventy-four separate bombing raids over Germany itself, apart from their work over the battle area, and engaging nearly 2,000 enemy batteries.

These are figures of combat work only. In a single month the Royal Air Force has taken well over 40,000 photographs over enemy lines. There is also work carried out in co-operation with artillery by means of which the fire of the gunners is directed with precision upon enemy guns and gun emplacements, billets, transports, dumps, railways, and concentrations of troops.

During the year ended June 30 British airmen accounted for considerably over 4,000 enemy aircraft, while the number of British machines reported missing was just over 1,000. Apart from new production, which is, of course, enormous, the Royal Air Force now reconstructs many more machines in a month than Britain possessed altogether at one stage of the war. It is no uncommon thing for British airmen to bomb military objectives in Germany itself three times in one day.

Hydro-Aeroplane Base to Cost $2,000,000

Galveston.—It is authoritatively announced that the hydro-aeroplane training base which the Navy Department will construct here will cost approximately $2,000,000, and will be the largest in the United States. The proposed buildings, for which plans are now being drawn by L. B. Hyde, civil engineer in the Navy Department, will cover 60 acres.

Plans call for the erection of six hangars, built in two sections, and with accommodations for 24 hydro-aeroplanes. The hangars will be erected at the north-eastern part of the site fronting Galveston Bay. Each section will be 104 x 105 feet in area and completely equipped for the housing of flying machines. Each section of the hangars will be provided with a landing pier 200 feet in length. To the south of the hangars will be the machine-shops and repair shops.

A considerable portion of the site will be devoted to the ground school, where student aviators will receive preliminary training.

An observation tower, 120 feet in height, will be erected, from which the officers in charge of training may have a good view of the flyers in training and observe the character of their work.

There will also be an office building and an administration building, each two stories high.

The building to be used as quarters for the officers and student aviators also will be a two-story structure, somewhat in the shape of a letter H. The ground floor of one side of the building will be devoted to the recreation room, dining room, kitchen, store room, refrigerators, etc. The remainder of the building will be quarters, with each bedroom 10 feet 6 inches by 12 feet 6 inches.

Barracks for several hundred men, with mess hall and other necessary equipment, will be provided, as well as a dispensary.

Athletic Building Dedicated to Dead Flyer

Mount Clemens, Mich.—The new athletic building which has been completed at Selfridge Field was dedicated on Aug. 3 to the memory of Second Lieutenant John P. Boyle, an aviator and athlete, the first officer to meet death at the field. Local people assisted substantially in erecting the building, pledging more than $2,200.

American Fliers Win Over Boche at Front

American trained fliers of the 1st Pursuit Group at the front, according to the latest authentic records given by Captain Lyster, Adjutant, have downed the following planes: Lt. Campbell, 5; Lt. Rickenbacker, 4; Capt. Peterson, 3; Lt. Winslow, 2; Lt. Buford, 2; Lt. Mitchell, 2; Lt. Sewall, 1; Lt. Meissner, 1.

Working together the following men has downed one plane: Capt. Hall, Lt. Rickenbacker; Lt. Hambleton, Lt. Taylor; Lt. Hambleton, Lt. Buckley, Lt. Casgrain, Lt. McKeown and Lt. Mitchell; Lt. MacArthur, Lt. Patrol.

Cadets Get Privates' Pay for This Month

Because no appropriation has been made by Congress for the salaries of flying cadets they will receive the pay of enlisted men this month and until such time as the appropriation is made according to a telegram received from Washington.

It was reported that the pay of the cadets has been reduced to $30 a month, that of the private, but such is not the intention of the War Department, if the telegram received has been interpreted right. The cadet, whose pay is $75 a month, the increase being due to the danger of his work, will in all probability collect the difference between $75 and $30 after the appropriation has been made by Congress.

New Flying Field at Austin

Austin, Texas.—Penn landing field near Austin soon will be converted into a flying field in connection with the extension of the University of Texas radio school, and negotiations are under way for the university to take over St. Edward's College and convert it into an air and artillery radio operators' school, capable of handling 1,000 men.

Roe, Missing U. S. Flier, a Prisoner in Germany

London, Aug. 7.—Ensign O. N. Roe, of Massachusetts, a naval aviator reported missing since May 30 when his seaplane broke down off the Dutch coast after being attacked by five German planes, is a prisoner in Germany, according to a letter received from him today. He said two of his companions were killed. He was in the water a half hour, while the Germans fired at him, but was unwounded. The letter adds:

"I've been shifted about and am at Landschut now, from where I expect to go to a permanent camp. There is an American flier here, also a Royal Naval Air Service chap.

Quentin Roosevelt's Grave Found By Comrade

With the American Army on the Vesle, Aug. 7.—On a wooden cross at the head of a grave at the edge of a wood at Chamery, east of Fereen-Tardenois, is this inscription:

"Lieutenant Quentin Roosevelt, buried by the Germans."

German newspapers announced several days ago that Lieutenant Roosevelt, who disappeared during an aerial combat on July 17, had been buried by the Germans at Chamery, but until today the grave was not discovered. It was found by an American aviator. The inscription is in English.

The official American statement on Aug. 2 said: Last night our aviators successfully bombed the railroad station and yards at Conflans. Numerous hits were made, causing several fires and one large explosion. All of our machines returned.

The following is authorized by the Secretary of War dated August 5, 1918: On August 3, our aviators shot down four hostile aeroplanes.

Harvard Flier a Prisoner

A cablegram has been received from the International Red Cross saying that Lieut. Joseph Mellen, Ninety-sixth Aero Squadron, had been in a German prison camp since July 12.

He is twenty-four years of age and a graduate of Harvard. He got the Croix de Guerre in 1915, when driving an ambulance in France. He came back to this country when the United States entered the war and joined the flying service. He was one of the six fliers chosen for the first American bombing expedition over German territory on June 14. His brother, Chase Mellen, Jr., is a lieutenant in the Twenty-third Infantry.

New Florida Air Field to Be Named Hiestand

Washington.—A new aviation field at Fort Meyers, Fla., has been named Hiestand Field by the War Department in memory of Benjamin Hiestand, aviation instructor killed last June in an accident while instructing a flying cadet.

The new field will be an auxiliary for Carlstrom and Bell fields, which are located near Arcadia, Fla.

Royal Canadian Air Service

Ottawa.—Hon. A. K. Maclean, Acting Minister of the Department of the Naval Service, announced on August 8 the formation of the Royal Canadian Air Service. This organization will come under the direction of the Naval Department, and has for its primary object the defence of Canada's coasts, but men enlisting in the Air Force will be liable for service outside the Dominion if necessary. Candidates accepted for the Royal Canadian Air Service will be entered as cadets, and will be required to sign on for three years, or for six months after the duration of the war.

It was stated at the Department today that pilots for seaplanes, aeroplanes and kite balloons were required immediately in connection with the organization. Only young men, British-born, or naturalized British subjects, between the ages of 17½ and 26, and in the highest medical category, will be accepted, and arrangements have been concluded with the militia authorities under which accepted candidates will be released for service in the Royal Canadian Air Service. Seaplane cadets, it is stated, will be trained in the United States this winter, and airship cadets will be sent to England for training.

The Naval Department is now open to receive applications from young men with the necessary qualifications who wish to enter as pilots in the air service. Applications should be made on the forms supplied for the purpose, which may be obtained by writing to the Recruiting Secretary, Department of the Naval Service, Wellington street, Ottawa. The department requires that applications shall be accompanied by a copy of the candidate's birth certificate, a recommendation as to character from some responsible adult, and a doctor's certificate as to medical category. Instructions will be given by the department as to the nearest doctor for purposes of medical examination, and in connection with this, traveling expenses, where necessary, will be refunded.

Wright Field Closed

Dayton, Ohio.—Wilbur Wright Field, as a flying school for aviation cadets, has been discontinued. The field will be used as an armorer's school.

D'Annunzio Flight Sets New Record

Washington.—The Italian Embassy received on August 10 details of the sensational flight of eight bombing planes over Vienna in a despatch from Rome, saying:

"The flight of Gabriele d'Annunzio over Vienna was to have taken place several days ago and was delayed on account of the poet's slight illness. It has now taken place with happy results. The flight was made over the barrage zones at an altitude of more than 15,000 feet.

"The Italian machines, under the command of d'Annunzio, made the flight at an average of 15,000 feet, covering a distance of 700 kilometres each way, a total distance of slightly more than 800 miles in sixteen hours. The poet was most enthusiastic over the idea of flying to Vienna, realizing the enormous moral importance of the feat. More than 1,000,000 manifestoes were dropped on Vienna, being intended to acquaint the Austrian people with the real situation at the front."

"We Italians," the manifesto declares, "do not make war on women, children and old men—only on your blind, obstinate, cruel government, which cannot give you either peace or bread, but feed you on hatred and illusion.

"You have the reputation of intelligence. Why have you donned the Prussian uniform? It is suicide for you to continue the war. The decisive victory promised you by the Prussians is like the bread from Ukraine. One dies while waiting for it. People of Vienna, think of yourselves. Awake!"

The flight is said to be a long distance record for a squadron of planes. One of the machines did not return, and is thought to have been forced down in hostile territory by engine trouble.

Device Aids Altitude Trips

Chicago, Aug. 10.—Tests of the new oxygenizing apparatus for aviators in high altitudes made here have brought unusual results, according to an announcement today by Albert C. Clark, a State Senator, producer of the device.

Senator Clark has ascended with Lieut. Jack Foote and attained an altitude a mile higher than the 11,642 feet which Lincoln Beachey reached in August, 1911.

Senator Clark said the apparatus weighs about three pounds and regulates automatically the supply of oxygen according to the altitude.

Aviators Fly 2,000 Miles

London, Aug. 10.—Two Royal Air Force officers, with two mechanics, have completed a flight from England to Egypt, a distance of 2,000 miles, in a type of aeroplane that has seen considerable service on the front.

Gives Home for Wounded Fliers

Mrs. William E. Corey has given her French home, the Chateau Villeggenisse, near Paris, to the American Red Cross, as a convalescent home for wounded American aviators, it was announced by Lawrence Harris, aid to Major James H. Perkins, Red Cross Commissioner to Europe. The chateau is located in the midst of 200 acres of gardens. It was once the home of Jerome Bonaparte.

American and British Air Tour Arranged

The American and British air tour will start at Washington and take in cities in various sections of the country.

Cities to be visited by the American and British aviators have been selected and approximate dates determined upon. Unfavorable weather conditions may cause alteration of some of the dates.

Maj. C. K. Rhinehardt, U.S.A., will be in command of the party, which will start from Washington. The guest of honor will be Brig. Gen. Charles F. Lee, G.M.G., veteran British aviator, now head of the British aviation mission to the United States. In the party will be several other British and American aviators. Flights and lectures will be given at the cities visited.

The cities with the approximate dates follow: Cincinnati, August 14; Dayton, August 15; Columbus, August 16; Cleveland, Aug. 17-18; Toledo, 19; Detroit, 20-21; Indianapolis, 22-23; St. Louis, 24-25; Kansas City, 26-27; Des Moines, 28-29; Minneapolis and St. Paul, September 1-2-3; Milwaukee, 4; and Chicago, September 5-6.

Kenly Flies to San Francisco

San Francisco.—The aeroplanes bearing Maj. Gen. William L. Kenly, director of military aeronautics, and Lieut. O'Neall, his aid, arrived from Mather field, Sacramento, at noon on August 1st.

New Balloon Pilots' School

Secretary Daniels announced last night that the Navy Department contemplates establishment of an additional training school for balloon pilots.

The school probably will be located at some point east of the Mississippi and south of the Ohio River.

Belgian Ace of Aces Decorated By King

The Belgian ace of aces, Sublieut. Coppens, who has destroyed twenty-one German war balloons in the last three months, has been honored by King Albert of Belgium, who conferred upon him the rosette of Officer of the Order of the Crown and the cross of Knight of the Order of the Crown.

A despatch to the Belgian legation said King Albert in person, in the presence of many pilots and officers lined at attention before many aeroplanes in battle formation and a battalion of infantry, pinned the decoration on Coppens' uniform and congratulated him in a brief speech.

Coppens is the son of a well known Belgian artist, Omer Coppens.

Fixes Rank of Officers

A bill introduced August 5 by Senator Chamberlain at the request of Secretary Baker, provides that when two or more officers of the same grade are on duty one may be appointed to command without regard to seniority of rank in the same grade. In the absence of such assignment officers of the same grade would rank as follows:

First, officers of the same grade in the Regular army and marine corps; second, officers of forces drafted or called into service and third, officers of volunteer forces.

(*Continued on page* 1128)

Mr. Harry Bowers Mingle, president of the Standard Aero Corporation, presenting American flags to the Aerial Mail pilots

The list comprises Max Miller, former flying instructor at San Diego, Cal., 1,000 hours in the air; Maurice A. Newton, Brooklyn, N. Y., experimental flier and instructor, 1,100 hours in the air; Robert Shank, military flying instructor, Dallas, Tex., 1,200 hours in the air; Ed. V. Gardner, advanced flying instructor, Dallas, Tex., 1,400 hours in the air; V. P. Hollingsworth, military flying instructor, Dallas, Tex., 1,000 hours in the air. Reserve fliers, E. Leroy Langley and L. B. Boldenweck.

The AIRCRAFT TRADE REVIEW

Badges and Bonus for War Workers

War workers' badges are to be given to the employes of the American Bronze Corporation, of Berwyn, one of the first companies in this district to adopt this policy in conformity with a recommendation of the War Department that faithful service of employes engaged in the manufacture of war materials should be recognized. The bronze company, is devoting nearly all its output to war purposes. In carrying out its plan of recognizing the workers, the American Bronze Corporation has arranged to award each employee a bronze war workers' badge, which, at the expiration of thirty days, will be exchanged for a silver badge, provided the employe has rendered faithful and loyal service. After wearing the silver badge for one month each employe will receive a cash bonus, which will continue for a period of six months, after which he is awarded a gold badge with his name engraved thereon. This gold badge entitles the employe to the cash bonus during the entire period of his employment, provided he qualifies under the regulations.

The presentation of these war workers' badges will be made a feature of the "house-warming program," on the occasion of the opening of the new plant just completed by the American Bronze Corporation at Berwyn. This new plant is of the most modern construction and equipment throughout and more than triples the present capacity of this rapidly growing concern.

The exercises will begin at 2:30 in the afternoon, when the new plant will be formally turned over by the contractors, Crowell, Lundoff & Little, following which E. J. Cattell, city statistician of Philadelphia, will dedicate the service flag. Notwithstanding the fact that 90 percent of the output of the American Bronze Corporation is devoted to the production of war essentials, one-fourth of the eligible employes have answered the call. Following Doctor Cattell's remarks, addresses will be made by executives and department heads. In the evening at 7:30 Captain Schwab will present the war workers' badges to the employes.

Officers of the corporation are John W. Watson, president and general manager; Matthew C. Dittmann, vice president and treasurer; Richard A. Watson, secretary and production manager.

Develop New "Liberty Aero Oil"

Washington, D. C.—Development of a new aircraft engine oil to be known as the "Liberty Aero Oil," to be used in the Liberty engine and all stationary cylinder aircraft engines, by the Army and Navy, was announced today by the Department of Military Aeronautics. The new oil is a mineral oil, the result of experiments lasting 12 months, carried on by a staff of men who worked uninterruptedly on the problem. One officer worked so intensively that he became ill and died. This was Captain O. J. May. Captain May personally supervised the running of 37 engine tests in 25 days in a laboratory where 5 engine tests a week would ordinarily be a complete program. To determine lubrication and fuel at high levels Captain May went to the altitude testing laboratories, an airtight building capable of having the air within it partly reduced and kept constant by means of exhaust air pumps.

It is stated that the new oil will be available in quantities sufficient to meet our aeroplane needs and that it will cost about 75 cents per gallon.

Plans have also been completed and placed in operation for the reclamation of used oil, and at least 50 percent can be used again under the scheme devised.

Detroit Aircraft Bureau Moves

Detroit.—The bureau of Aircraft Production has been moved from 870 Woodward Avenue to the fourth floor of the Ford Motor Co. branch, and the entire working force of more than 200 people is now at work in the new quarters.

Rapid Growth of Aeronautics Department

Washington, D.C.—The Department of Military Aeronautics, recently organized, has grown to include more than 1,000 civilian employees in addition to the officers and enlisted men. Thirty stenographers and 50 typists are needed by this department, particularly those who are qualified to take dictation and make transcription in both French and English. Applicants should call upon or address the Civilian Personnel Office, Department of Military Aeronautics, Building B, Sixth and B Streets, N. W., Washington, D. C.

624 Men Called for Aircraft Board

Washington, D. C.—Provost Marshal General Crowder has issued a call for 624 limited service men for duty with the Aircraft Production Board. The majority of them will report for work at various mechanical trades at Kelly Field, San Antonio, Texas. Twenty-four of the men will perform clerical work in Washington.

The Executives of the Dayton-Wright Aeroplane Company, who have received country-wide congratulations during the past month upon the completion of the first thousand De Havilland battleplanes and having brought the production of battleplanes at the Dayton-Wright plants up to over twenty-five daily. On the left is Mr. C. F. Kettering, in the center Mr. H. E. Talbot, on the right Mr. H. E. Talbot, Jr.

Philadelphia Aircraft Plant Completes Fifty Flying Boats

Washington, D. C.—The first order for 50 naval flying boats placed with the new navy aircraft factory at Philadelphia has been filled and the greater part of the machines are now flying over British waters. This was revealed in a statement by Secretary of the Navy Daniels. The first flying boat had a successful trial flight on March 27.

The forms for the first boats were laid October 12, 1917, despite the fact that the factory building itself was not completed until November 28. These feats prompted Secretary Daniels' letter containing these statements and felicitating Naval Constructor F. G. Coburn, who is in charge of the naval aircraft factory.

The contract for the aircraft factory was awarded August 6, 1917, and work began the same day. The original factory had 160,000 square feet of floor space. An extension adding 55,400 square feet was begun February 26, 1918, and is now completed.

Howard C. Caldwell, assistant advertising manager of the Haynes Automobile Co., Kokomo, Ind., has resigned to enter the Great Lakes Training Station.

A. B. Walker, until recently associated with the Budd Wheel Corporation, Detroit, has joined the Bureau of Aircraft Production and will report immediately at a station in the East.

Machine Shop Addition for Falls Motor

Sheboygan Falls, Wis.—The Falls Motors Corporation will erect a machine shop addition immediately. This will be a 2-story building, 60 x 125, and is to be used for the completion of Government contracts for truck, aeroplane and tractor engines and parts.

Issued New Catalogue.

The Steel City Electric Company have just issued their new catalogue No. 33 and will gladly send a copy to any concern that did not receive one in the regular mail distribution.

Nash Men Dine Charles W. Nash

Kenosha, Wis.—Department heads and foremen of the Nash Motors Co., Kenosha, Wis., tendered a banquet in honor of Charles W. Nash, president and general manager of the company, who left July 31 for Washington to assume his duties as assistant to John D. Ryan, director of aircraft production, in charge of engineering and production. While in the government service, Mr. Nash has relinquished active connection with his company.

Personal Pars.

W. O. Kennington, who was assistant chief engineer of the Remy Electric Co., Detroit, at the time of the outbreak of the war, has returned to Detroit from the war front, where he is connected with the British Air Ministry. He will remain in this country for a month and then return.

Peter A. Frasse, who was the first to be patronized by the pioneer aeroplane constructors, advise AERIAL AGE that they no longer supply metal products for aeronautic purposes.

Aircraft Production Purchases

Washington—The following is a list of purchases contracted for by the Air Service, Aircraft Production:

Dyneto Electric Corp., Syracuse, N. Y., 100 battery charging sets.

Eastman Kodak Co., Rochester, N. Y., 12,600 dozen commercial plates.

Eastman Kodak Co., 750 gross process films.

Austin Mfg. Co., Harvey, Ill., 1 motor sweeper and supplies.

Dominion Asbestos & Rubber Co., 154 Nassau Street, New York City, 1380 sheets asbestos.

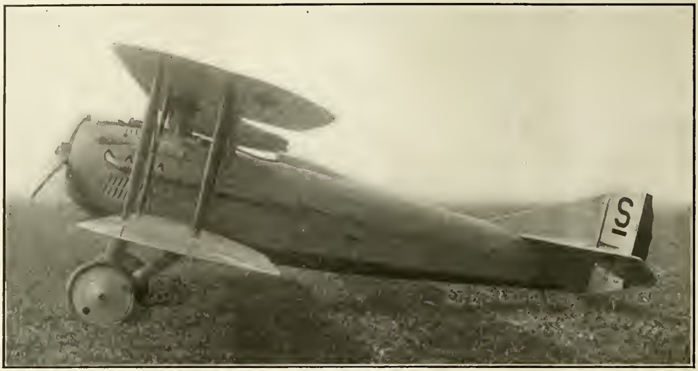
American Bleached Goods Co., New York City, N. Y., 90,000 yards balloon cloth.

Hawkeye Division, Eastman Kodak Co., Rochester, N. Y., 25 aerial lenses.

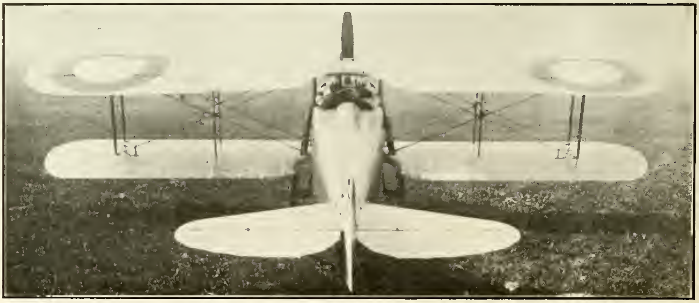
United States Lens Co., Geneva, N. Y., 1200 negative lenses.

Ward Leonard Electric Co., Mount Vernon, N. Y., 200 battery charging panels.

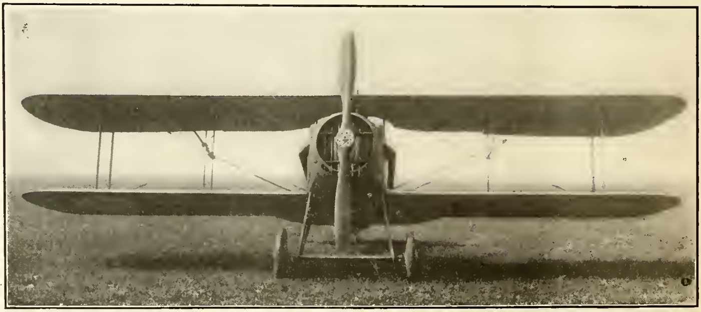
(*Continued on page* 1123)



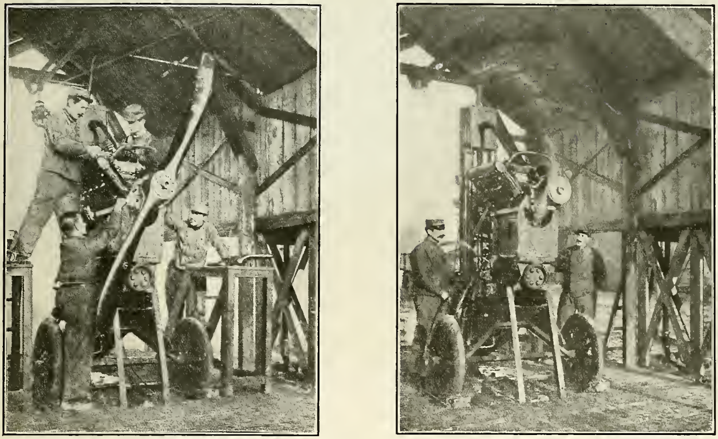
A French Spad biplane. It is a single seater used for pursuit work. It is equipped with two synchronized machine guns and is driven by a Hispano-Suiza motor of 220 H.P. (French Official Photo)



Rear view of the 220 H.P. Hispano-Suiza Spad biplane



A front view of the Spad biplane. Note the metal interplane struts, the "Eclair" propeller, and open cowl. (French Official Photo)



Two Hispano-Suiza motors being tested at one of the French aviation centers

DEVELOPING THE HISPANO-SUIZA MOTOR FOR THE AIR SERVICE

Story of the Invention of This Engine by a Swiss Engineer Widely Used by the French

By GEORGE H. HOUSTON

President and General Manager, Wright-Martin Aircraft Corp.

PERHAPS the most interesting achievement in the stupendous manufacturing expansion of this country during the past year lies in the field of aviation, motor, and plane construction. Behind the romance of the flying man who fights lies the ability of the great plants throughout the United States that are the backbone of the air programme.

Considered as an industry in which there is no precedent for the judging of standards, it is really remarkable that, inside of fifteen months from the declaration of war, our production should have reached the figures that are now being officially announced.

Unfortunately for us, as a nation, we did not take aviation, motor, and aeroplane development and construction quite as seriously as some of our allies, with the result that, when forced into the war, we found ourselves the parent of an orphan child, farmed out with distant cousins for its education and upbringing.

Born of us, in the persons of the Wright brothers, but sent away at a tender age, our knowledge of the infant was nearly all theory, and there was much for us to learn. As a great nation it was most embarassing. As a people, it was mortifying to realize that we had no great aeroplane motor as our contribution to the winning of the great cause abroad.

Considering the wonderful potential manufacturing resources of the country, there were two things for us to do: (1) Select a motor of recognized and accepted performance abroad and it into immediate production; (2) evolve from the designs of our best engineering talent a motor that would fit into the air programme of our allies and relieve them of a burden at a sorely trying time.

Our answer to the first has been the Hispano-Suiza; to the second, the Liberty, with which everybody is familiar. In deciding upon the Hispano-Suiza we have selected what is said to be the best aeroplane motor yet developed in France and upon which practically all the best known French motor builders are concentrating. The story of the engine and its designer is interesting. In the late 90's Marc Birkigt graduated from one of the best engineering schools in Switzerland and entered into the employ of a mining company near Barcelona, Spain. His ability seemed to lie in the designing of intricate mining machinery, rather than in internal combustion engines. Yet one of the officials of his company persuaded him to work out a design that would meet the severe strains of Spanish roads, and he consented to do so. It was understood that he was to supervise the construction of seven from his own design, which were to be mounted on chassis for the several officers of the company. They proved such a great success that the first one was presented to the King of Spain, whose interest immediately resulted in the erection of a factory for the commercializing of the car, under the name "Hispano-Suiza" (Spanish-Swiss).

In the early part of 1906 the Hispano-Suiza car attracted the attention of M. Charles Faroux, one of the best known French motor-car engineers, who urged Birkigt to manufacture in France for the French trade. A plant was started near Paris, and production began in a small way.

Motor racing was then in its heyday, and Birkigt and Faroux entered the comparatively small Hispano-Suizas with great success.

With the coming of the great war, in the summer of 1914, the sales outlook was indeed dark, and convinced that the wave of patriotism sweeping over France just then would not accept a Swiss-designed car controlled by Spanish capital, Birkigt closed down the Paris plant and went to Spain and tried to busy himself with production there until the end of the war, leasing the French factory to the Gnome Company, who were building their well known rotary type of motor for the French Air Service. The fact was that practically every French motor-building company was then producing only rotary motors, including Le Rhone, Renault, Lorraine-Dietrich, etc.

To fill in his spare moments, Birkigt designed a "fixed" (non-rotary) aviation motor, eight cylinders, water-cooled, and extremely light for its 150 horsepower. Its bore and stroke were 4 11-16 inches by 5½ inches, respectively, and its first trials in Barcelona were successful.

It was at this time that the French Government was in need of fresh impetus in the air, and Major Martinot-Lagarde, a well known army authority, together with several other officers, was ordered to Barcelona to watch the demonstrations. Their report recommended the immediate adoption of the engine if certain endurance tests could be successfully passed.

The result of these tests was another success, and large orders were then placed by the French Government, which more than taxed the capacity of the French and Spanish plants—making necessary the sub-contracting for 450 in the United States to a company organized here for that purpose.

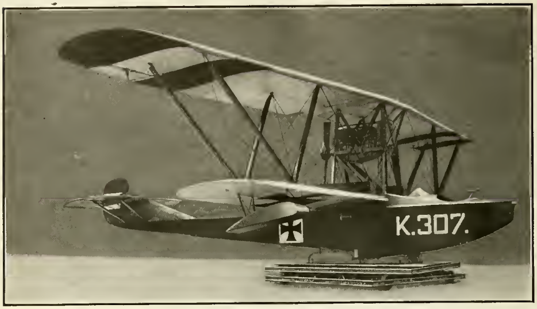
The success of the French Air Service on the western front was immediate.

It was only on May 19 last that Lieutenant Fonck, the premier French "ace," brought down six German planes and the second day following three more. He was using a Hispano-Suiza motor.

At the present time there are, or have been, nearly 50,000 of these motors in the French Air Service. There are seventeen French, two English, and one American plant turning out these motors, and it is a monument to Engineer Birkigt's ability that the foreign motors and parts, from whatever plant, are absolutely interchangeable.

When compared with the now well known German Mercedes, it is found to have 500 less parts, and the raw material weighs at least one-third less, important factors in first costs.

Of the fixed motors, France has used the Hispano-Suiza in its several sizes almost exclusively in her lighter machines, the fast Spad types, and the one and two-seaters of the combined fighting and observation sort. The new 300-horsepower Hispano-Suiza will undoubtedly be used in the day bombing planes, where speed and quick climbing ability are combined with a very certain weight-carrying capacity.



An Austrian flying boat captured by the Italians

Missing Aviator Returns Safely

Paris.—Rumors of the disappearance of Lieut. William T. Ponder of Texas, an aviator, have proved groundless. Ponder was forced to land during a reconnaissance over the German lines because of engine trouble and for a time was unable to rejoin the French flying section to which he was attached temporarily. He turned up two days ago.

Flyer Reaches High Altitude

On Wednesday, July 24th, First Lieut. B. R. Switzer established a new height record for Langley Field. Accompanied by Lieutenant Nietz of the Science and Research Department, Lieutenant Switzer reached a maximum height of twenty-two thousand feet. This feat is the more remarkable because neither Lieutenant Switzer nor Lieutenant Nietz wore oxygen masks, which are invariably worn at altitudes above twelve thousand feet. The time of the flight was one hour and three quarters, the temperature at the maximum altitude was —10 degrees Centrigrade, and the machine was a Curtiss R-4, equipped with a Liberty motor.—*Langley Field Propeller.*

Capital Aviator Gets Third Enemy in France

Following the bringing down of his third German plane after a fight over the German lines, Lieut. G. DeFreest Larner, of the Highlands, has been appointed a flight commander in the American aviation service in France, according to a cablegram received in Washington.

Lieutenant Larner went to France in June, 1917, where he joined the Lafayette Escadrille. He joined the American squadron last December and was commissioned lieutenant in January.

In March he received the Croix de Guerre for bringing down his second enemy plane.

Duck Hunting in an Aeroplane

The rich who have time on their hands are on the trail of a new form of sports, although it may be said in its support that men of the aviation corps have a very good argument in its favor as an aid to marksmanship.

This new sport is nothing more or less than hunting ducks by aeroplane, the incentive, of course, being the opportunity for wing shooting against double speed. That is, the machine is traveling at bird speed while the ducks are likewise doing record work.

Nearly a Plane a Day for a Year Downed in Two Weeks in France

Washington.—An account of the activities of the French air service obtained from authentic sources shows that tons of bombs are being rained on the Germans night and day.

During the period of the first two weeks in June, French airmen dropped 600 tons of high explosives on the trenches of the enemy forces, on rest billets, railway stations and on munition plants far back of the German lines.

A total of 27,673 flights were made for military purposes during the period, and more than 2,000 combats took place in the air.

During these combats 199 enemy planes were forced down inside the French lines and 161 other machines were damaged and likely destroyed, making a total of three hundred and sixty enemy planes acount for—nearly one a day for a year, but condensed to a period of two weeks. The French loss during these combats amounted to but 72, twelve of which were only damaged.

In direct aid of the army, the French pilots and observers made 1,159 photographic trips and secured 19,478 snap shots of the German forces and positions. They took 303 long range flights during this period, covering enemy territory for hundreds of miles. This is in addition to the concerted action of the British and American

French observers reported on July 17 that thirteen enemy aeroplanes fell in the region over which an American pursuit squadron was patrolling and fighting. Within the Americ lines it had been considered sure that the Americans had downed eight and possibly nine enemy planes.

Lieut. John McArthur of Buffalo drove down a German two-seater in a fight that began near Dormans, and during which the American pilot flew within 100 feet of the ground, where German anti-aircraft and machine gunners abounded. He returned with several bullet holes in his machine, fired from guns on on the ground.

On the way he encountered eight enemy machines, but fought all of them off and landed safely. McArthur fired 500 shots during his travels. This makes his record three enemy machines brought down.

Five German aeroplanes and one balloon were destroyed by American aviators in the fighting over Dormans, on the River Marne.

Zenos Miller of Wooster, O., brought down a balloon and fought off three Fokker machines. Charles . orter of New Rochelle, N. Y., knocked Charles P. Porter of New Rochelle, N. Y., knocked down a German whose machine fell 1,000 feet. Francis Simmons of New York City, brought down two German machines in the same flight. Arthur Jones from Haywards, near San Francisco, brought down one aeroplane and Ralph O'Neill of N..ogales, Ariz., destroyed a two-seater.

Press Dispatches About American Aviators

With the American Army in France.—While the American troops are adding fresh lustre to their fine record the American airmen also are winning distinction. In fighting German formations, patrolling and machine gunning the troops and transports they well have fulfilled their share of the battle.

Within the German lines in the last two days the Americans have brought down seven enemy machines with the loss of only one of their own. One American airman forced an enemy machine to land behind the American lines and coolly landed beside it and took the German pilot a prisoner. Another American attempted a similar performance, but the Germans had made a slight advance during the night and instead of capturing the German he was taken a prisoner.

Lieut. Walter Avery of Columbus, Ohio, in his second flight over the enemy lines brought down a German machine. He went over to see his capture and found that he had brought down Captain Mainkopf, who asserts he has destroyed fifteen British and French planes and one American. The German was proud of his record until told that he had been brought down by an American. He lost his temper when informed that his opponent was a new pilot.

With the American Army at the Marne.—Six German aeroplanes were brought down by American airmen in a series of magnificently successful sky encounters July 24th.

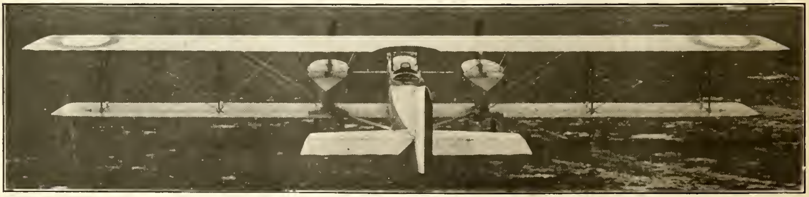
Late in the evening, while patroling north of Chateau Thierry, Lieut. Wilbur T. White, of New York, got lost from his patrol in the clouds and encountered two Albatross machines of the double-seater type. White attacked and saw a tracer bullet enter the head of one of the German pilots. The machine fell out of control. Then, diving, the American fired upon the leading Albatross, the bullets entering the fuselage. The macihne began a spinning nose dive and then crashed.

Six Americans engaged a group of twelve German machines, downing four of them.

With the American Army in France.—Lieut. A. R. Brooks of Framingham, Mass., and Lieut. David E. Putnam of Newton, Mass., of the American aerial forces, report that they brought down an enemy aeroplane behind the German lines at Montsec, the same mountain which obscured Putnam's recent victory from observation and, consequently, official credit.

After daylight on July 23 two German planes, with machine gunners aboard, flying low, attacked an American supply train south of Sergy. They were driven off by anti-aircraft guns.

The Germans later attacked a dressing station. Word of this having been sent to the aerial commander, an American aviator soon arrived and, single-handed, attacked the Boches from above. In trying to get away the Germans collided. The wings of their machines locked and the planes fell, both aviators and gunners being killed.



The Caudron R 11 type of French Bombing Biplane. Twin motored, it carries two and sometimes three men. The nacelle projects considerably in front of the plane thereby insuring a large arc of fire

On the British Front.—American airmen with the British air squadron destroyed approximately thirty German machines recently, many of them being of the new type of Fokker fighting plane. They have accounted, too, for a number of enemy balloons. For the number of Americans engaged and for the short time during which they were fighting against the enemy in company with crack British airmen their record is a splendid one, and no one is more enthusiastic about the work of these airmen than the British commanders of these squadrons, as well as the heads of the air service.

I was given the opportunity to see the stories of the American pilots on the fights in which they had taken the measure of the foe. "They're very brief," said the air force official who showed them to me, and he added: "They have done very well, but they have said very little about it."

In fact, about four lines of typewritten matter in the most undramatic fashion told how one of these Americans had destroyed two enemy machines in the course of a few minutes' fighting when the British patrol, of which he was a part, was suddenly attacked by an overwhelming force of Germans. The fight ended very successfully for the Anglo-Americans.

The same pilot has three Germans to his credit, and several of the others have two each, while many have destroyed one enemy plane each. Some who have beaten German planes also have destroyed sausage balloons.

"I dived from 17,000 to 4,000 feet," said one report, telling how the American pilot had come down from the clouds at a terific burst of speed to destroy an enemy balloon, which blew up like an ammunition dump when his machine gun riddled it as he swept past. Another American pilot had dived at it about the same time, and managed to send several bursts of machine gun fire into it also, as the German observers dropped from it in parachutes.

In still another report an American pilot told how he became sure of his victim by watching him go down very near the earth absolutely out of control, following one burst from his machine gun. British air commanders and pilots have frequently told me latey that the American airmen as well as the British airmen, believe in the attacking policy. If anything they must be restrained, because they are impatient to be scouring the skies all the time.

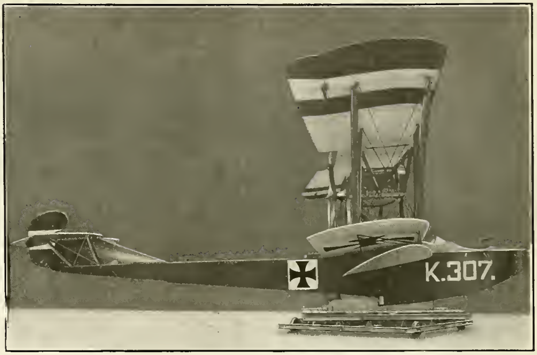
French-English Stenographers Needed for the Air Service

So rapidly has the Department of Military Aeronautics grown, since the reorganization of this branch of service by the Secretary of War, that it already had over 1,000 civilian employees, in addition to its officers and enlisted men.

A call has been issued to the public for thirty (30) additional stenographers and fifty (50) additional typists. A particular need of the Department is for stenographers who are qualified to take dictation in both French and English and make transcription accordingly. Applicacants should call upon or address the Civilian Personnel Officer, Department of Military Aeronautics, Building D, Sixth and B Streets, N.W., Washington, D. C.

Boyau, French Ace, Bags 5 More German Fliers

Paris—Sub-Lieutenant Boyau has gained five additional aerial victories, three of which were won in ten minutes each. His total is now twenty-nine. Lieutenant Madon has increased his string of victories to thirty-eight.



Another view of the Austrian flying boat captured by the Italians

New Aeronautical Books Received

Obtainable through The Aeronautic Library, Inc., 280 Madison Avenue, New York City.

PRACTICAL FLYING, by Flight Commander W. G. McMinnies, R. N. Price $1.60 postpaid.

The first practical work on actual training and instruction for the flying services, covering the whole field, from elementary groundwork to advanced flying. Illustrated with hundreds of diagrams and detailed drawings, also a complete glossary of flying terms and phrases.

AIRCRAFT MECHANICS HANDBOOK, by Fred H. Colvin. Price $3.20 postpaid.

A collection of facts and suggestions from factory and flying field to assist in caring for modern aircraft. It explains the functions of the different parts of the aeroplane in considerable detail, by the use of language readily understood by the average mechanic. There are drawings, together with instructions regarding their care and maintenance. Specifications are given of the several types of training planes which have been approved by the War Department. There are chapters on instruments for aeroplanes and on the Lewis Machine Gun.

HIGH ADVENTURE, by James Norman Hall. Price $1.60 postpaid.

A narrative of air fighting in France, written with vividness, humor and a wealth of human interest.

AIRCRAFT AND SUBMARINES, by Willis J. Abbot. Price $3.75 postpaid.

Within a compass of 382 pages Mr. Abbot has given one of the most complete one-volume presentations of the past and present history of these great war machines. He not only knows his subject, but supplements the text with a very complete series of illustrations in color by John D. Whiting and some photographs.

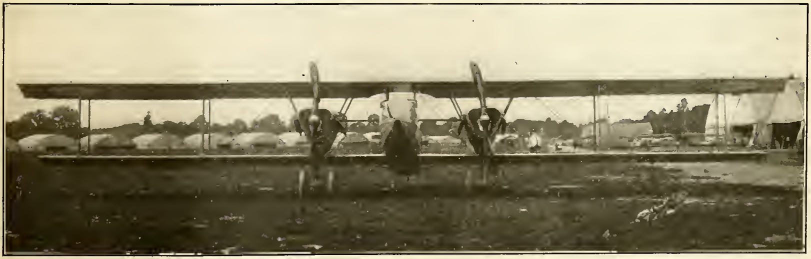
All Aeroplanes With Bombs

With the American Army in England.—Almost every aeroplane used by the Allies soon will carry bombs. Experts in aerial warfare are convinced that the general efficiency of the corps will be increased if a bombing device is added to every plane sent out, even though it be of the type once intended only for scout work, and Americans now training in England are being as carefully drilled in bombing as in handling a machine gun.

Lessons learned during the recent offensive have served to increase the high regard of both British and American officers in theair service for the low-flying, bomb-carrying craft, and, over the camps and countryside where aviators are being trained, planes are in evidence almost every hour, dipping down and skimming the nearby country, barely missing treetops and houses. It is the newer lesson they are learning, and observers back from the front, where the allied planes did such remarkable work, not only in scouting and distracting the enemy, but actually in breaking up formations and at points checking the onward movement, have urged concentration on that form of training.

British trainers, detailed to American aviation camps, have been liberal in their praise of the new fliers from overseas, their only criticism being that the Americans are "a bit too keen."

The bombing device being attached to virtually every plane is not the contrivance that was used in the earlier days of the war. The device now being used is one with which the operator may, with much practice, becomes almost as proficient in markmanship as an artilleryman is with his gun. Almost every light plane will cary bombs of at least twenty-five pounds, and from the heavier types there will be hurled the huge containers of high explosives not materially different from those used by the Germans in some of the more recent raids.



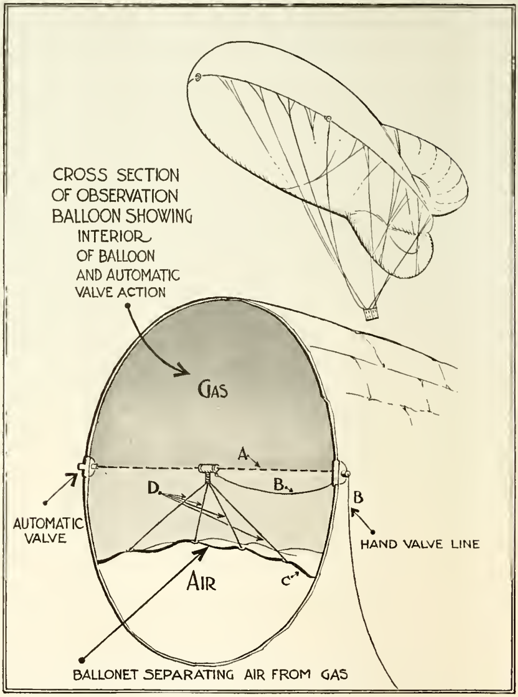
A front view of a Caudron R 11 French Bombing Biplane. This machine is a three (3) seater and is driven by two Hispano-Suiza motors and it carries five machine guns

MILITARY AEROSTATICS

By Lieut. H. K. Black, R. F. C., C. F. A.

IT is rather difficult to describe in mere words the action of the ballonet in an observation balloon so that there will be a constant internal pressure. The automatic valve action is also a complicated arrangement to explain in words.

Practically it is very simple indeed. It would take only about fifteen seconds to understand it, if it could be seen working. The valve itself, is generally made of aluminum, though sometimes they use wooden valves. In this country the authorities made some inquiries as to whether the metal valve did not make the balloon more likely to be struck by lightning. My personal opinion is that it makes no difference. I must admit that I have not gone into the subject very deeply, but I speak from my own experience.



CROSS SECTION OF OBSERVATION BALLOON SHOWING INTERIOR OF BALLOON AND AUTOMATIC VALVE ACTION

Wooden valves on the contrary always gave us considerable trouble in France. The weather there is not of the character which prevents warping. Then the wooden valves always leaked to some extent which generally brought a letter from headquarters asking about the increased consumption of gas.

The aluminum valves gave fairly general satisfaction and they could stand a great deal of rough handling, though they looked so fragile.

The illustration given herewith shows a balloon in section looking at it from the bow, at the point where the automatic valve cord runs transversely across the balloon. The reader, I hope, can understand from this just how the valve works. I quite candidly say that the exact arrangement of the lines in a Cacquot balloon is not shown here as, at the present time it is not in the best interests of the Allied cause that this particular detail be shown.

The automatic valve arrangement can be easily seen from the drawing. The automatic valve on the left is connected by a cord (A) to a stop immediately opposite to itself. Riding on this cord is an aluminum thimble. The thimble is fastened to a series of spiderleg cords, which in turn are sewn to the upper surface of the ballonet (C). In a previous article the action and function of the ballonet was described. Recapitulating therefore, when the gas in the envelope expands it forces the ballonet downward, thereby keeping the internal pressure constant. At the same time, as the ballonet is forced down, it takes with it the spiderlegs (D), which, in turn draw the aluminum thimble with them. This thimble, riding downward on the automatic valve cord (A) shortens it and the increased tension opens the valve.

As the gas escapes, the internal pressure tends to become less. The pressure of the air in the ballonet, under pressure of the wind entering the rudder, forces the ballonet upward again, the spiderlegs release the aluminum thimble, the automatic valve cord is released in its turn and the valve closes under the pull of its self-contained springs. It sounds quite like a "house that Jack built" story.

The hand valve arrangement is almost too simple to explain. The hand valve line (B) leads from the automatic valve line to the basket of the balloon. When the observer pulls the hand line the valve opens of course.

The hand valve line is very seldom used except in cases of emergency when the balloon has broken away and is in reality a "free" balloon floating with the wind. In a case of that kind, the balloon breaking its cable of course releases a lot of weight and the balloon rises rapidly. To bring the bag to earth again, gas must be released, and by the judicious use of ballast and the hand valve line, the landing is made the same as in the regular free balloon training.

Another device, which is unfortunately not shown in the illustration, for use in emergencies is the rip panel. This is a sheet of fabric cemented, and sewed in with only one row of stitches, at the top of the balloon near the bow. A line connects it with the basket. In the case of a break-away, when the balloon is drifting with the wind toward the Hun lines, about all the observer can do is to throw his instruments and maps overboard and jump over with his parachute. There is a chance that he may pull this rip cord, tear the rip panel out and then jump. This will bring the balloon down in our own lines in many cases, as the gas escapes and the balloon commences

(Continued on opposite page)

PERMANENT AERIAL MAIL SERVICE GREAT SUCCESS

THE permanent Aerial Mail Service inaugurated August 12 is a great success.

The Postal Service, directed by the able and energetic Second Assistant Postmaster-General Praeger and Captain B. B. Lipsner, the superintendent of the Aerial Mail Service, is a real asset to the country.

The aviators are all civilian experts:

The list comprises Max Miller, former flying instructor at San Diego, Cal., 1,000 hours in the air; Maurice A. Newton, Brooklyn, N. Y., experimental flier and instructor, 1,100 hours in the air; Robert Shank, military flying instructor, Dallas, Tex., 1,200 hours in the air; Ed. V. Gardner, advanced flying instructor, Dallas Tex., 1,400 hours in the air; V. P. Hollingsworth, military flying instructor, Dallas, Tex., 1,000 hours in the air. Reserve fliers, E. Leroy Langley and L. B. Boldenweck.

The first trip of the permanent aero mail service was made on August 12. The weather in Washington was fair and about 2,000 people, including many officials and aeronautic authorities went to College Park, Md., to the new aerial mail station to see the start. The mail comprised over 285 pounds of letters and papers and included several thousand letters sent by the Aero Club of America, the Aerial League of America, AERIAL AGE WEEKLY, *Flying* and *Air Power.*

At Belmont Park the weather was bad, but the start was successful. The mail was carried from New York to Philadelphia by Robert Shanks. He had a very successful flight.

The storm caused the landing of pilot Newton while flying from Philadelphia to New York.

In a heavy storm, 2,000 feet in the air, Newton's engine went dead when he was within two minutes of landing with his mail at Belmont Park. He landed in a ploughed field. His machine ran its nose in the soft earth and turned over. Newton escaped from the wreckage unhurt.

The accident was the first on the New York-Philadelphia leg of the air mail route and the first interruption to service at this end in six weeks. Not a flyer has been injured since the route was opened in May.

Aero Mail Record for July

The July record of the Aero Mail Service, as shown in the monthly report of Second Assistant Postmaster General Praeger, surpasses that of June. During July out of 108 possible flights 98 perfect flights were made, without interruption through forced landings or mechanical troubles. Only 2 of the 108 legs were defaulted on account of weather, and only 8 forced landings were made. Four of the forced landings were by an officer new in the work and the route.

The flights during the month covered a total of 11,855 miles.

The best performances made by aviators were in the order following:

Lt. J. C. Edgerton, 18 perfect trips with a total of 2,430 miles, without a single interrupted flight.

Lt. Walter Miller, 10 perfect trips with an aggregate of 1,710 miles, without a single interrupted flight.

Lieut. E. W. Killgore, 16 perfect trips, aggregating 2,160 miles, and one interrupted flight, and our uninterrupted flight.

Lt. H. P. Culver, 14 perfect flights, aggregating 1,350 miles, and one interrupted flight.

Lt. T. H. Webb, 12 perfect flights, aggregating 1,080 miles, and one interrupted flight.

During the month all mail speed records were broken when on July 29th the mail was carried from Washington to New York in two hours and five minutes' flying time.

Storm flying records were established when Lieutenants Edgerton, Bonsal and Killgore put their machines through driving rain and wind storms that practically shut out visibility, flying entirely by compass and making perfect landings. On the New York-Philadelphia end, several flights were made by Lieutenants Miller, Culver and Webb through fog, haze and rain.

Leg from Washington to Philadelphia	135 miles
Leg from Philadelphia to New York	90 miles

(*Continued from opposite page*)

to fall within about ten or fifteen seconds. I have never tried it, but that is what we were told. When the balloon falls that way, it is very likely to overtake the observer in his parachute and, falling on the parachute destroy the observer's chances of landing safely. The practice of ripping before jumping was never advocated.

In a free balloon flight the rip panel is also used to deflate the balloon rapidly when landing. I have also known cases where the rip cord was pulled when the balloon became unmanageable in a high wind on the ground.

The illustration shows the panel construction which was mentioned in the previous article.

(*To be continued.*)

Performance of Aviators During Month of July, 1918

Total possible number of flights	108
Total possible mileage	12,150
Total perfect (uninterrupted) flights made	98
Total interrupted flights made	4
Total flights defaulted on account of weather	2

Pilot	Perfect Flights No.	Perfect Flights Miles	Interrupted Flights No.	Interrupted Flights Miles	Uncompleted Flights No.	Uncompleted Flights Miles	Total Flights No.	Total Flights Miles
Lt. J. C. Edgerton	18	2,430	..	...	..	...	18	2,430
Lt. Stephen Bonsal	10	1,215	..	...	..	...	10	1,215
Lt. E. W. Killgore	16	2,160	1	135	1	65	18	2,360
Lt. Walter Miller	19	1,710	..	...	..	...	19	1,710
Lt. T. H. Webb	12	1,080	1	90	..	...	13	1,170
Lt. H. P. Culver	14	1,350	1	135	..	...	15	1,485
Lt. Gordon Dodge	9	1,035	2	225	2	225	13	1,485
Total	98	10,980	5	585	3	290	106	11,855

Aerial Mail Operation for the Month of July

Date 1918	Miles Flown	Hours of Flying Hrs.	Hours of Flying Min.	Mail Carried A.	Mail Carried O.	Percent of Performance	Arrival Wash.	Arrival N. Y.
	1.	2.		3.		4.	5.	
1	270	3	42	39	220	50%	4.37	6.15
2	450	6	26	51	710	100%	5.05	3.30
3	450	5	27	40½	615	100%	3.05	2.44
4	450	6	05	37½	158	100%	4.25	3.15
5	443	5	52	37	698	75%	4.00	3.05
6	450	6	00	51½	696	100%	3.25	2.40
8	450	5	51	40½	402	100%	3.35	2.20
9	450	5	57	34½	674	100%	3.47	2.12
10	450	5	35	36	677	100%	3.30	1.58
11	385	5	23	39½	675	75%	5.30	2.28
12	450	5	14	40½	659	100%	2.55	2.32
13	380	4	49	30½	544	75%	3.00	2.25
15	450	5	40	393	493	100%	3.03	2.20
16	395	5	07	37	469	75%	3.26	2.17
17	450	6	01	51	764	100%	3.35	2.11
18	450	5	45	47	554	100%	3.00	2.28
19	450	5	51	46½	621	100%	2.55	2.46
20	464	6	18	43½	503	75%	4.17	2.50
22	450	6	13	47½	590	100%	3.36	2.18
23	450	6	34	47	635	100%	3.45	2.41
24	450	6	04	43½	645	100%	3.26	2.25
25	450	5	57	39	653	100%	3.28	2.18
26	450	5	49	41½	639	100%	3.04	2.36
27	450	5	53	39½	656	100%	3.10	2.40
29	450	6	09	45½	526	100%	4.17	2.15
30	450	6	47	46½	582	100%	4.40	2.25
31	383	6	05	30	433	75%	3.00	2.46

Note: Number of hours dead flying for month, 19 hrs. 3 min.

Explanation of Tabulation:

1. **Miles flown:**

Leg from Washington to Philadelphia	135 Miles.
Leg from Philadelphia to New York	90 Miles

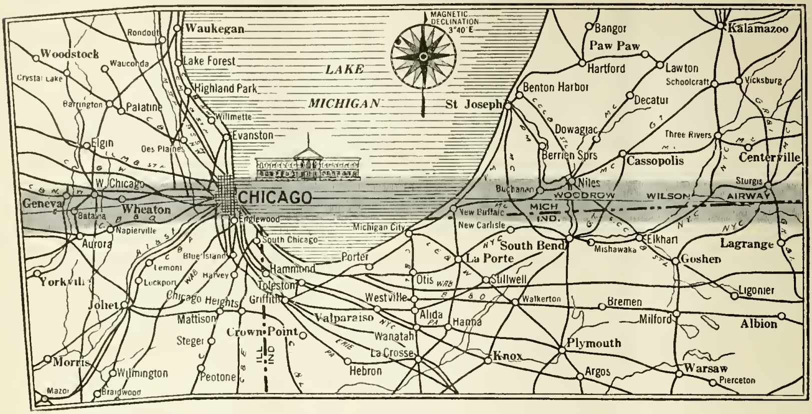
Miles flown for the day, whether one, two, three, or four legs of the trip have been made. The aim is to get exactly the number of miles flown in connection with the mail service each day. Therefore, mileage of partial trips should be indicated.

2. **Hours of flying:** To include the actual hours and minutes machine is in the air with mail.

3. **Mail carried:** In this column, under A., give pounds of aeroplane mail; and under O., give pounds of ordinary mail.

4. **Percent of performance:** Round trip Washington-New York consists of four legs, each leg valued at 25% if completed by aeroplane and not by train before close of day.

5. **Arrivals:** Time plane reaches Washington and New York, or, if train carrier, the scheduled time.



(Map copyrighted by the Aeronautic Maps Association, 299 Madison Avenue, New York.)

Section of the Illinois-Michigan Division of the Woodrow Wilson Airway

WOODROW WILSON AIRWAY MAP COMPLETE

THE map of the Woodrow Wilson Airway has been completed and will be published in the Aero Blue Book, being issued by the Century Company. Copies can be obtained through the Aeronautic Library, 299 Madison Avenue.

The maps, which have been made under the direction of Messrs. Henry Woodhouse, Captain Russell Hastings Millward and Captain Robert A. Bartlett, the famous explorer, comprise 17 sections extending from New York to San Francisco. They have cost $6,000 to make it, exclusive of cost of printing.

The Woodrow Wilson Airway was named after President Wilson last year by the Aero Club of America, when the President signed the $640,000,000 appropriation for army aeronautics.

The Aero Club of America adopted a resolution to establish the Woodrow Wilson Airway, and communicated the resolution to Congressman Hulbert, who was prominent in conducting the campaign for the building of our aerial defenses, requesting that he present the matter to President Wilson. The President's answer was as follows:

"*My dear Mr. Hulbert:*

Thank you warmly for having let me see the enclosed telegram. It heartens me mightily. It is very delightful to have such a feeling exist and to receive such evidences of support and approval.

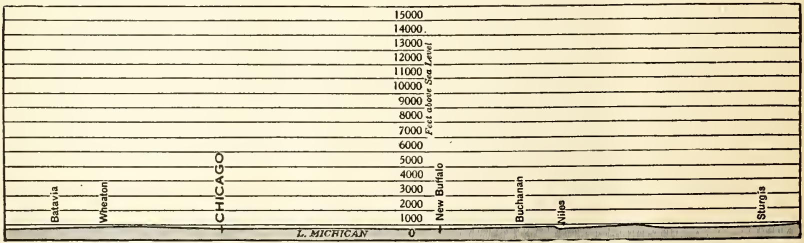
Cordially and Sincerely Yours,
WOODROW WILSON.

The Woodrow Wilson Airway represents a zone eighty miles in width, extending from New York to San Francisco. A line through this zone touches the most important cities, through the States of New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Utah, Nevada and California.

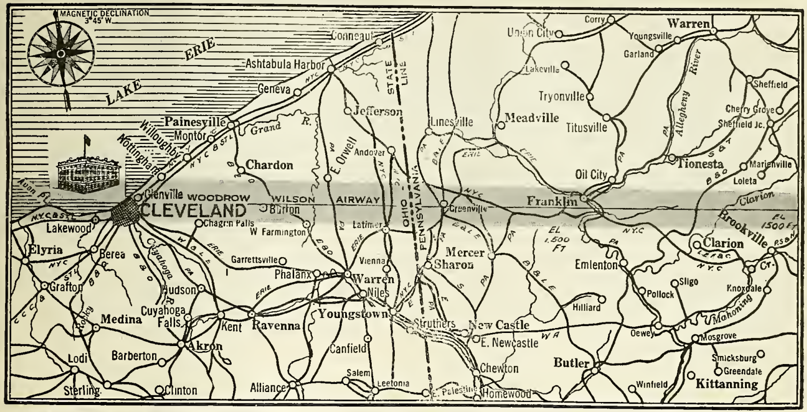
The Airway zone extends forty miles on each side of the line, so the air traveler can reach the extreme part of either side of the zone in half hour flying. Any city or community located within this eighty miles belt will be designated as being on the Woodrow Wilson Airway. Landing places for aircraft and identification marks will be placed first in the important places in direct line of the Airway, then at the approach of every community.

The delivery of the proofs of the Wilson Airways Maps, on August 1, 1918, established a record in the delivery of mail from New York to Washington.

A few minutes before eleven o'clock that morning Post-



One of the charts of the elevation along the Illinois and Michigan Division of the Woodrow Wilson Airway



The shaded line indicates the Woodrow Wilson Airway which comprises a belt eighty miles in width. All cities and communities on this map are designated as being on the Woodrow Wilson Airway, including railroads, mountain ranges and other natural features. At bottom of page elevations along airway. Railroads and national highways crossing and paralleling the Woodrow Wilson Airway: Baltimore and Ohio. Cleveland, Cincinnati, Chicago and St. Louis. New York, Chicago and St. Louis. Pennsylvania. Wheeling and Lake Erie. Erie. Buffalo and Lake Erie. Pittsburgh, Shawmut and Northern. Lake Erie, Franklin and Clarion. Western Allegheny. Sheffield and Tionesta. Lincoln Highway. (Copyright by the Aeronautic Maps Association.)

master Patten's office in New York was notified by Second Assistant Postmaster Otto Praeger of Washington, to call up Mr. Henry Woodhouse and notify him that the Postmaster would like to have by return of mail a set of advance proofs of the maps of the Woodrow Wilson Airway.

Although the message was only received a few minutes before eleven o'clock, Postmaster Patten's messenger called on Mr. Woodhouse at the Aero Club of America, No. 297 Madison Avenue, a few minutes after eleven o'clock, and received the proofs of the Wilson Airway maps and other information, and they were sent by Aerial Mail, leaving New York at 11:30 A. M., in an aeroplane, to arrive in Washington about two and a half hours later.

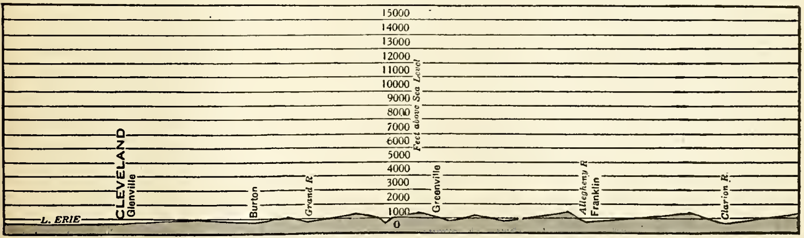
The Woodrow Wilson Airway is a belt eighty miles wide, following the great circle from New York to San Francisco, and crossing the following states: New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Utah, Nevada, California.

The maps are made especially for the use of aviators and show land marks, elevations and other important things which an aviator must know when he flies.

The Aero Blue Book which is being issued by the Century Company gives the 17 sections of the airway, including the maps, the tables showing the elevations, the scales in statue and nautical miles and kilometres, and the names of the communities included in each section of the Wilson Airway, and the names of the railroads and national highways crossing and paralleling the Wilson Airway, the location of weather bureau stations, magnetic declinations, etc.

It also gives a plan showing what a permanent aerodrome and an emergency aviation field should be, together with other useful information regarding wind direction arrows, and other means of signaling and directing aviators.

It also gives the plans for the employment of aircraft for utilitarian purposes after the war, the plans for other airways and air routes, different kinds of aeronautic maps, the list of a dozen or so of international and national trophies and events to be competed for as soon as the war is over and other similar very useful information, data, and aeronautic records which cannot be found anywhere else.



One of the charts of the elevations along the Ohio and Pennsylvania Division of the Woodrow Wilson Airway. (Copyrighted by the Aeronautic Maps Association, 299 Madison Avenue, New York.)

THE L. V. G. BIPLANE TYPE C. V.

L'Aérophile for April, 1918, contains an interesting description of the L.V.G. biplane, type C.V., a translation of the substance of which is reproduced, with certain illustrations, under a due sense of obligation to the editor of that excellent French technical paper.

Comparative specifications of the L. V. G. biplanes C.II., C.IV., C.V., and Rumpler C.IV.:—

	L.V.G.			Rumpler
	C.II.	C.IV	C.V.	C.IV.
Span (upper wing)	12.85m.	13.60m.	13.62m.	12.60m.
Span (lower wing)	11.35m.	12m.	12.85m.	12.10m.
Total length	8.10m.	8.60m.	8.10m.	8.4m.
Height	3m.	3.10m.	3.20m.	3.25m.
Lifting surface	37.60sqm.	40sqm.	42.70sqm.	33.50sqm.
Weight	845kg.	900kg.	920kg.	1010kg.
Power of motor	175h.p.	235h.p.	225h.p.	260h.p. 250h.p.
Make of motor	Mercédès	Mércèdes	Benz	Mércèdes or Maybach

Note. 1 metre = 32.37 inches.
1 sq. metre = 10.75 sq. feet.
1 kilogramme = 2.2 lbs.

The L.V.G. type C.V., which is constructed by the Luft Verkehrs Gesellschaft (Aeronautical Transport Company), is a two seater. It belongs to the "general purpose" class, sometimes known as the Army Corps type.

Less speedy on the flat than the Rumpler C.IV., described in *The Aeroplane* of February 27th, 1918, its rate of climb is inferior (4,000 metres in 35 minutes), and equally its ceiling is less elevated (a little more than 5,000 metres).

Its speeds are as follows:—

At 2,000 metres	164 km. per hr.
At 3,000 metres	160 km. per hr.
At 4,000 metres	150 km. per br.

THE WINGS

The upper and lower wings are set at a dihedral angle, more so the lower ones.

This dihedral is of 1° to the upper wings and of 2° to the lower. They are neither staggered nor swept back.

The trailing edges of the wings are flexible. The ribs are spaced about .4m. apart, with false intermediary ribs. The incidence of the wings is as follows:—

At 1st and 2nd ribs	4.5°
At 3rd to 9th ribs	5°
At 10th rib	4.75°
At 11th rib	4.5°
At 12th rib	4°
At 13th rib	3°

The upper wings, viewed in plan, are slightly trapezoidal, with rounded edges.

Their chord is 1.74m., and in the centre a semicircular piece is cut out of the trailing edge above the pilot's head.

The ailerons project past the ends of the wings by .34m. Their form is rounded, and resembles that of the ailerons of the Gotha. Their total length is 2.61m. Their chord varies from .53m. inside to .75m. at the projecting portion.

The hinges of the ailerons are parallel with the leading edge of the wing. They are attached by means of pins or bolts threaded through hinge loops, held in place by keys, on the system employed to attach the ailerons on the Roland fighter D.II. The arrangement has the advantage of permitting the quick attachment of the members.

The lower wings, following the present tendency and taper at the rear, as in the D.F.W., Rumpler C. IV., and Albatros C. IV. Their maximum chord is 1.59m.

The aileron cables pass through the interior of the lower wings.

The interplane struts (two pairs on either side of the fuselage) are constructed of streamline timber 105m. in diameter, and tapered towards both ends. By reason of the differing dihedral of German aeroplanes, are rounded at the ends, angles the inside and outside struts are not the same length.

The outer struts are 1.635m. long and the inner ones 1.59m.

The gap between the wings is 1.74m. at the fuselage and 1.66m. in line with the external struts.

The total lifting surface is 42.9 sq. m., that of the upper plane being 23.73 sq. m., and the lower 19.17 sq. m.

The cabane struts are in the form of an "N," inclinded towards the rear, and converging to the fixed centre section of the upper plane, the width of which is .12m.

THE TAIL

The shape of the stabilizing plane, or fixed tail plane, resembles that of the Albatros fighter. At the same time, it should be noted that its leading edge is flatter, and it is therefore not so deep.

The tail plane consists of two separate parts attached one on each side to a fixed section embodied in the fuselage, which like it is constructed of three-ply.

The elevator is a single flap, with rounded corners and balanced by a triangular extension at each end. The greatest width is 3.04m. and the depth .65m. The small triangles have a base of .39m. and are .39m. high.

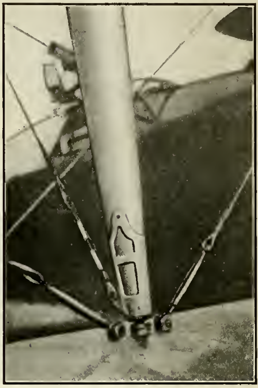
At the outer angel of each of the tail planes one finds a projection of about .020m., intended to eliminate vibration from the tips of the balanced ends of the elevators by screening them from the air blast.

The balanced rudder is placed above the elevator, and forms with the fixed fin an oval inclined backwards.

The fixed fin is constructed of three-ply, and is trapezoidal in shape. The total height of the vertical empennage is 1.068m.; its depth is .675m. (1.15m. including the compensated portion). One finds on the fixed fin a projection in front of the compensating point of the rudder similar to those found on the fixed tail planes.

The internal structure of these members consists of steel tube-work.

The control cables pass through the fuselage, coming outside 1.50m. from its extremity; one pair of the elevator cables pass through a channel in the thickness of the stabilizing plane.



A detail view of a strut socket

The fuselage is entirely built of varnished three-ply, and is rectangular in form, with a well-rounded top, the underside being slightly less rounded. The sides have a slight outward bulge, accentuated at the level of the pilot's seat.

The general lines are not so slender as those of the Rumpler C.IV.

THE POWER PLANT

The L.V.G., C.V., is driven by a Garuda airscrew, type V., with a diameter of 3.04m. The boss of the airscrew is enclosed in a "Casserole," or pot, .58m. diameter.

The motor is a 225 h.p. Benz, also used in the D.F.W. and F.D.H.G. II.

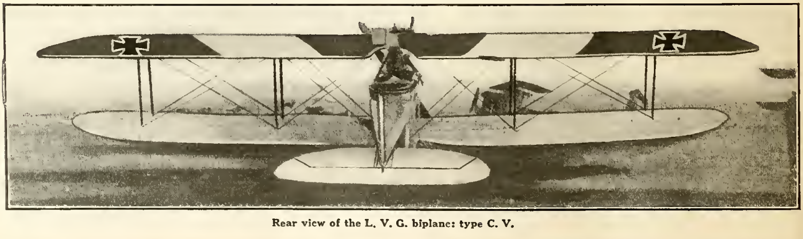
It is fed by two tanks, with a capacity of 249 litres. On the upper left wing is fitted a feed tank. The contents of these tanks permit of a flight of about 3¼ hours.

The upper portion of the motor is entirely covered in with a panelled and removable sheet steel bonnet.

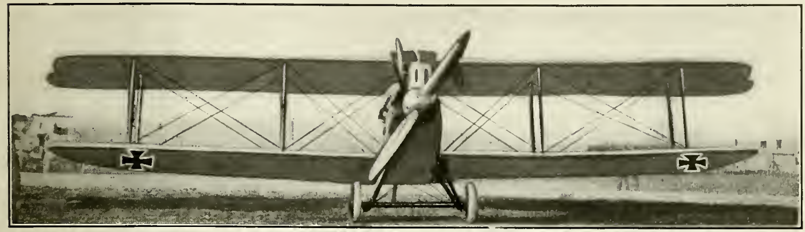
The exhaust is led overhead as in the Rumpler C. IV. Contrary to that machine it is not much curved, but rises nearly vertically. [The drawings and photographs show a slight curve.—Ed. *The Aeroplane.*]

The honeycomb radiator, the capacity of which is 35 litres, is placed in front of the wings. It is rectangular in shape, and is attached to the cabane struts by two brackets. Its upper part is attached to the fixed centre section of the upper plane by a small steel tube fork.

The temperature regulating blind placed in front of the radiator is one of the best in use. It is simpler and more rational than the system of shutters. It consists of a movable blind of strong fabric, which is rolled and unrolled at the will of the pilot, which permits the stoppage of the



Rear view of the L. V. G. biplane: type C. V.



Front view of the L. V. G. biplane: type C. V.

passage of air and the regulation of the cooling. [One commends the idea to the super-elaborators of the R.A.F. Technical Department.—Ed.]

Accommodation

The accommodation for the pilot is of oval form, the bigger dimension being in the direction of travel.

Very close to this is arranged the passenger's seat inside a turntable .86m. in diameter, which carries a "Parabellum" machine gun.

In front and on the right side is a Spandau machine gun firing through the airscrew, and controlled by a Bowden wire.

Wireless apparatus is installed.

The landing carriage consists of two pairs of streamline "V" struts built of timber, and a pair of wheels 810mm. x 125mm.

The tires are marked "Harburg," Vienna. The wheel track is 1.98m. The axle is placed in a streamline wooden fairing.

The suspension consists of "Sandow" elastic cord.

As in the Rumpler C. IV., a drag cable runs from the front of the fuselage to the base of the inner interplane strut.

The tail skid, which is attached to a small fin underneath the fuselage, is constructed of wood, and is terminated by four steel laminations .002m. thick.

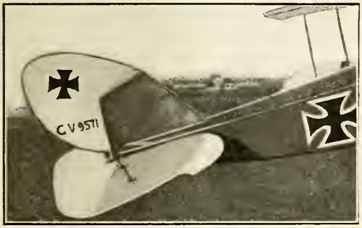
The skid is sprung with elastic cord.

The machine is camouflaged in bright green and mauve on the upper sides of the wings and on the horizontal empennage.

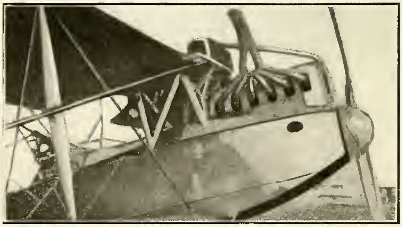
The under sides of these surfaces are bright blue.

In the passenger's cockpit a hole in the floor permits the passage of a camera.

The machine described above was apparently intended for photographic reconnaissance. It carried no bomb-dropping gear.



A view of the tail members



A view of the exhaust manifold

(*Continued from page* 1113)

Brown & Sharpe Mfg. Co., Providence, R. I., 1 universal and tool-grinding machine.

American Bleached Goods Co., New York City, N. Y., 15,000 yards balloon cloth.

The Anderson Chemical Co., Wallington, N. J., 2,000 gallons diacetone alcohol.

Brown & Sharpe Mfg. Co., Providence, R. I., 1 tool-grinding machine and attachments.

American Cellon Co., 887 Fifth Avenue, New York, N. Y., 50,000 gallons cellulose acetate dope.

Napier-Browning Co., 105 West Fortieth Street, Jersey City, N. J., 6100 connectors.

Bell & Howell Co., Candler Building, 220 West Forty-second Street, New York, N. Y., motion picture equipment, cameras, lenses, etc.

General Radio Co., 11 Windsor Street, Cambridge, Mass., 2500 receiving sets.

Geo. H. Amick, Clendenin, W. Va., 50,000 feet walnut lumber.

Guy Leonard, Baltimore, Md., services as supervisor of construction and operation of plants manufacturing acetate of lime and other chemicals.

Western Electric Co., 463 West Street, New York City, 280 amplifiers, 300 transmitting sets.

Murray & Tregurtha Co., 340 West First Street, South Boston, Mass., 2 seasleds and motors.

Chemical Products Co., 30 Charles River Road, Cambridge, Mass., 42,000 pounds cellulose acetate.

Champion Ignition Co., Flint, Mich., 15,000 spark plugs.

Simmons Hardware Co., District National Bank Building, Washington, D. C., 5000 gunners' safety belts.

Lewis Thompson & Co., Colonial Trust Co. Building, Philadelphia, Pa., 25,000 feet Mexican mahogany lumber.

Canadian Aeroplanes (Ltd.). Toronto, Ontario, Canada, 150 planes for Curtiss Canadian aeroplanes.

Ericsson Mfg. Co., Buffalo, N. Y., 95 items, spares for Berling magneto D-18, contact springs, screws, interrupter levers, etc.

American Propeller & Mfg. Co., Baltimore, Md., 1000 air fans.

Century Telephone & Construction Co., Buffalo, N. Y., 109 instruction buzzer sets.

Century Telephone & Construction Co., Buffalo, N. Y., 50 instruction buzzer sets.

Russell, Burdsall & Ward Co., Port Chester, N. Y., 37,000 galvanized lag screws.

Contracts were placed by the Ordnance Department of the U. S. Army, as follows:

Remington Typewriter Co., New York; models of bomb release mechanism.

Edward G. Budd Mfg. Co., Philadelphia; aeroplane flares.

Four-Wheel Drive Auto Co., Clintonville, Wis.; spare parts for 3-ton truck, equipment and main shaft for ammunition trucks.

B. F. Goodrich Co., Akron; rubber equipment for heavy artillery repair shops.

Warner Auto Top Co., Cincinnati; pack carriers, breech lock mechanisms.

Nash Motors Co., Kenosha, Wis.; repair parts for Nash "Quad" trucks.

Parsons Scores His Fourth Air Victory

Paris.—Edwin G. Parsons, of Holyoke, Mass., has brought down his fourth officially credited enemy machine.

Parsons has been flying for two years in the Lafayette and Guynemer escadrilles.

A night despatch from General Pershing on the 26th of June said:

"Five American bombing planes raided Conflans last night, dropping explosives upon the railway station. There were good results. One German observation plane was seen but it did not attack. All the American machines returned safely."

Major Harold E. Hartley, of Saskatoon, Canada, is the newest American "ace" as a result of his air victory of June 25th when he landed his fifth German. His other four victories occurred while he was with the British Royal Flying Corps.

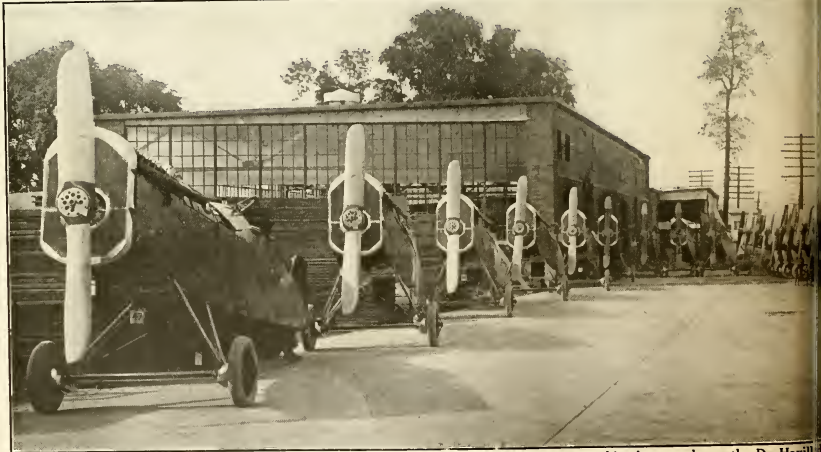
Lieut. James A. Shenden of Chicago, who lost his way and landed in Switzerland, is now interned there. His machine was smashed but he was unhurt.

Lieut. W. B. Ponder of Mangum, Okla., has been decorated with the War Cross with the palm for his valor in assisting the French in keeping the aerial vigil over the American troops in the Chateau-Thierry sector.

Lieut. Ponder is attached to a French Flying Squadron. On June 16 he brought down two German planes and with great daring helped to drive off ten other enemy planes.

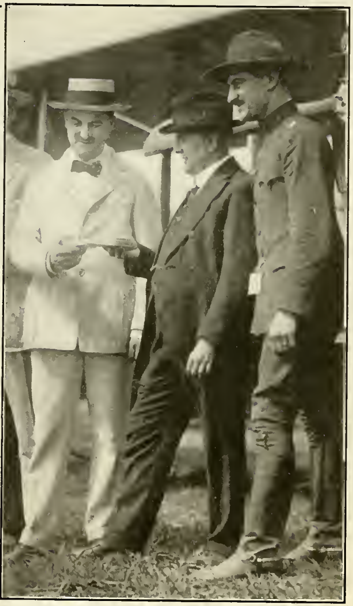
The first of the Standard Aerial Mail planes starting for its initial flight. It started from Elizabeth, N. J., at 6.30 and arrived in Philadelphia forty minutes later. It is equipped with a 150 H.P. Hispano-Suiza

Line-up of postal officials, aeronautical authorities, and officers and heads
Mail planes delivered to the postoffice on August 6th. From left to right
Service, who brought down 23 Germans while in the British service; Harry
of the Aerial League of America; Henry Woodhouse, Member of the Board
noted engineer of the Standard Aircraft Corporation; Mr. Max J. Finklest
ica; Mr. Harry Bowers Mingle, president Standard Aircraft Corporation; H
superintendent Aerial Mail Division, U. S. Postoffice; Mr. J. A. Edgerton,
poration; Mr. Walter C. Burton, postmaster of Brooklyn; Mr. William F.
chief assistants; Mr. Leroy B. Gulotta, managing editor of AIR POWER;
Mr. Praeger; Mr. Benjamin L. Williams, secretary

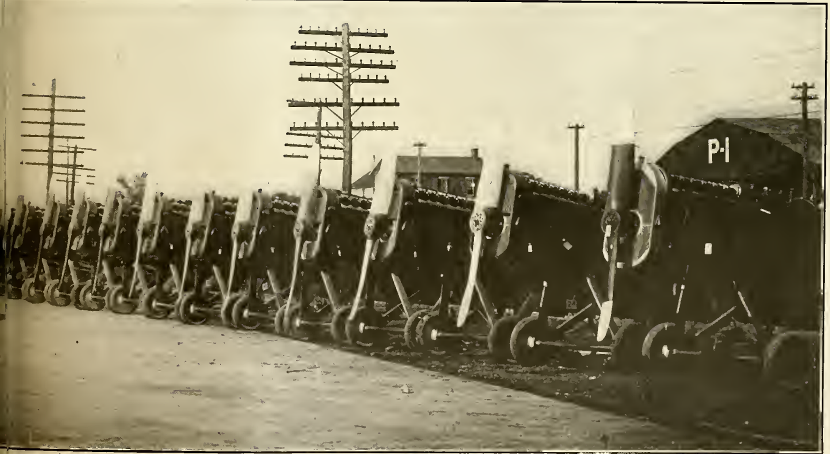


One day's output of the Dayton-Wright Airplane Co., at Dayton. The machines shown on this photograph are the De Havill
rate of production is increasing constantly. The metal part

**tments of the Standard Aircraft Corporation in front of the six Standard Aerial
Robert A. Bartlett, famous explorer; Captain Frederick Libby, American Air
ing, representative of the postoffice at Belmont Park; Augustus Post, Secretary
nors, Aero Club of America, Editor and Publisher of AERIAL AGE; Mr. Huff,
ard Aircraft Corporation; Mr. Alan R. Hawley, President Aero Club of Amer-
Praeger, second assistant postmaster general; Captain Benjamin B. Lipsner,
g agent U. S. Postoffice; "Rusty" Bounds, chief pilot, Standard Aircraft Cor-
tmaster, Elizabeth; Mr. John F. Sinnott, postmaster, Newark, N. J.; and their
, superintendent of mail of New York City; Mr. G. L. Connor, chief clerk of
ingle; Mr. Evan J. David, managing editor of FLYING**



Mr. Mingle handing to Postmaster Praeger and Captain Lipsner the first mail to be sent on the newly acquired postal aeroplanes



**anes equipped with Liberty motors. On July 31 the Dayton-Wright Co. completed the 1,000th battleplane of this type and the
attleplanes were made by the Dayton Metal Products Company**

FOREIGN NEWS

FRANCE

The French War Office on Aug. 2 issued the following statement:

On the 31st seven German aeroplanes were downed during the day. Twenty-two tons of explosives were dropped on aviation grounds between the Aisne and the Vesle and on barracks and encampments of the enemy in the valleys of the Ardre and Vesle.

The official statement of Aug. 8 contained the following:

During the month of July 184 enemy aeroplanes were drowned. One hundred and fifty-four enemy aeroplanes were seen falling out of control inside the enemy lines, of which number fifteen had been damaged by the fire of our aircraft guns. Thus 338 enemy machines were destroyed or badly damaged.

In addition our aeroplanes set on fire forty-nine enemy captive balloons.

During the same month our bombarding squadrons during the daytime dropped 194 tons of explosives and in the night time more than 356 tons, thus making a total of 550 tons dropped on bridges in the Marne Valley, on enemy troops that had advanced south of the Aisne, and on railroad stations in the region of Laon, Hirson and Rethel.

The French official for August 9th says:

"The French aviators have been a valuable auxiliary in the battle to the south and east of Amiens. In spite of a thick mist and low clouds, which increased the difficulty of their work, our squadrons made numerous reconnaissances above the enemy lines, taking part often in the fight with their machine guns. During the battle they captured four enemy aeroplanes. Four captive balloons were shot down. Finally our bombing machines dropped nearly ten tons of bombs during the night on railroad stations in the neighborhood of Chaulnes, Nesles, and Roye. Fires and explosions were observed, particularly in Roye and Nesles."

GREAT BRITAIN

An Admiralty statement on aerial acitivities, issued Aug. 2, says:

"Detailed reports have been received from Royal Air Force units, working with the navy in the Mediterranean, Adriatic and the Aegean. Anti-submarine and escort patrols have been well maintained in the Mediterranean and Adriatic.

"As indicated in recent Italian official communiques from Rome, our Adriatic formations have closely co-operated with the Italian air forces in raids on the Austrian naval ports of Cattaro and Durazzo, and in the land operations at Valona (Avlona).

"In the Aegean a constant reconnaissance of the Dardanelles has been maintained. In two raids on Kule Burgas, on the Oriental Railway, direct hits were obtained on the railway station, which was much damaged.

"A raid on the Karagachi Station and the bridge which carries the Oriental Railway across the Arda resulted in direct hits on the line, close to the bridge, and among rolling stock. A raid on the railway station and bridge at Uzenkopri resulted in damage to the station buildings.

"During a dawn reconnaissance of the enemy coast north and west of Imbros thirteen casques were observed. Bombs were dropped, damaging two and destroying a third. A new enemy aerodrome at Uzenkopri was bombed and photographs show much damage was done, one hangar being completely destroyed.

"A raid was made at dawn on July 26 on Nagara, and at night on Galata. A further raid on these two places was made during the night of July 28. Over half a ton of bombs were dropped and large fires were started. One of our machines failed to return.

"The basin and dockyard at Constantinople was successfully bombed just after midnight on July 27, but full details have not yet been received.

"In home waters during the period July 25-31, anti-submarine, hostile aircraft and escort patrols have been maintained. Submarines have attacked with success.

"More than fifteen tons of bombs have been dropped on objects of military importance at Zeebrugge, the Bruges docks and Ostend. Enemy shipping has also been bombed, and a direct hit with a 230-pound bomb was obtained on the stern of the leader of four enemy torpedo boat destroyers. Columns of smoke were seen to arise, but the mist obscured further observation.

"Our bombing patrol and escort formations have been attacked by enemy aircraft. Fifteen enemy machines have been destroyed and twelve shot down out of control. Five of our machines have failed to return, one of which is known to have landed in Holland. One of our seaplanes on patrol was shot down in flames. Two of the crew were drowned."

A weekly review of the air fighting shows that in the week seventy enemy machines were destroyed on the western front and eleven driven down out of control, while only twenty-seven British machines were reported missing. On the other fronts eighteen enemy machines were destroyed at a cost of two British planes.

In the course of the week there were seventeen raids into Germany, in which Offenburg was bombed three times and Stuttgart, Saarbruecken and Baden twice each. There were also eighteen raids on German naval and military bases in Belgium, in which Ostend was bombed four times, the Bruges docks thrice and Zeebrugge twice.

Major Edward Mannock, one of England's most successful flying men, who had fifty-eight German machines to his credit up to a month ago, is missing. He was last seen fighting over the German lines July 20, when his machine was observed to fall in flames.

A dispatch from Geneva reports that the British aerial attacks on the Stuttgart and Coblenz Railway Stations on Aug. 2 were the most terrible experienced during the war. Many tons of bombs were dropped, large portions of the stations were destroyed and serious interruptions to railway traffic was occasioned.

No trains from these two towns are arriving at Basle, but the Germans say this is because the railway is monopolized for military purposes. It is known, however, that the Royal Palace at Stuttgart was damaged, while at Coblenz a newly built ammunition factory was partially destroyed.

All travelers arriving in Switzerland from across the frontier declare that the terror of these successive raids is inceasing in the Rhine towns and that from Istein, near Basle, the exodus of population continues into the interior.

The text of the official statement relative to the air raid on Aug. 5th, follows:

"Five enemy airships attempted to cross the coast last night, but while still at sea were attacked by Royal Air Force contingents, cooperating with naval units.

"Three were engaged in action and one was shot down in flames forty miles from the coast. Another was damaged, but probably succeeded in reaching its base."

The novel feature of the raid was the early arrival of the airships. Two of them were actually seen approaching the coast by holiday makers from the promenade of a widely known seaside resort. It is considered possible that the Germans miscalculated the visibility, and by arriving before dark invited an easy defeat.

Aeroplanes immediately went in pursuit, and the Zeppelins, throwing out smoke clouds, turned northward and endeavored to escape. They were overtaken some forty miles from the shore and just before midnight one was brought down in flames and another damaged.

The following official communication on aerial operations was issued on Aug. 7:

Four German machines were shot down during the day of August 6 and one was brought down in flames in the following night. During the twenty-four hours, twenty-four tons of bombs were dropped by us on railways, aerodromes and billets of the enemy and several direct hits were observed. All our machines returned safely.

The statement for Aug. 8 reads:

On Aug. 7 observation was rendered difficult by grounded mist. However, a considerable amount of reconnaissance and photography was carried out. Over seventeen tons of bombs were dropped during the with good effect, and a large number of combats took place. Fifteen hostile machines were brought down, and seven driven down out of control. Two of our machines are missing.

A ton of bombs were dropped during the night, when operations were hampered by bad weather. One of our night flying machines is missing.

The following official communication was issued on Aug. 8 by the Air Ministry:

"On the morning of the 8th our machines carried out a successful attack on the explosives factories at Rombach, in Alsace-Lorraine, ten miles northwest of Metz. Good results were obtained. All our machines returned."

According to the latest report of the Royal Air Force, the British four years ago possessed less than 100 aeroplanes. Now the Royal Air Force destroys in a week on an average a larger number of hostile aeroplanes than that.

The number of German aircraft destroyed in June by the British alone reached 314, and 168 others were driven down out of control. Against that total of hostile machines destroyed, 168 British machines were reported missing.

In another month 518 German aircraft were accounted for and only 128 British machines were missing. During one month British airmen fired 915,308 rounds of machine-gun ammunition at ground targets, dropped 853 tons of bombs over different military objectives, and made four bombing raids over Germany, apart from the work over the battle area of engaging nearly 2,000 hostile batteries.

In a single month the Royal Air Force has taken more than 40,000 photographs over hostile lines. During the year ended July 30, British airmen accounted for considerably over 4,000 hostile aircraft. The number of British machines reported missing for the same period was just over 1,000.

Apart from new production, the Royal Air Force constructs more machines in one month than Britain possessed altogether at one stage of the war, while the personnel has been multiplied more than 200 times.

It is no uncommon thing for British airmen to bomb military objectives in Germany three times in one day.

At one repair park for air-force motor-transport in the battle zone in France to-day 1,000 hands are working day and night, and motor transport is but one of the minor factors, for this many-sided industry embraces almost every known trade and handcraft.

GERMANY

Berlin—The following statement on today's battle developments was issued Aug. 2 by German great headquarters:

Yesterday we shot down fourteen enemy aeroplanes. Our bombing machines were very active during the night and destroyed, among other things, a big French ammunition depot north of Chalons.

An official communication from Berlin says:

On the night of the 5-6th one of our airship squadrons, commanded by Captain Strasser, who so often has successfully led our airship attacks, again wrought heavy damage on the east coast of England by effective bombing attacks, particularly on Boston and Norwich and the fortifications at the mouth of the Humber.

With his brave crew, Captain Strasser probably met with a heroic death. All the other airships participating in the attack have returned without losses or damage, despite strong resistance.

The German official for August 9th said:

"We shot down over the battlefield thirty aeroplanes."

MODEL NEWS

Edited by John F. McMahon

CLUBS

THE AERO SCIENCE CLUB OF AMERICA
90th St., 7th Ave., Brooklyn, N. Y.
PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
CORRESPONDENCE MODEL AERO CLUB
Babylon. Long Island
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington. Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.

TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska
DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
TEXAS MODEL AERO CLUB
517 Navarro St., San Antonio, Texas

SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.
CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
PLATTSBURG MODEL AERO CLUB
c/o James Regan, Jr., Plattsburg Barracks, Plattsburg, N. Y.
MODEL AERO CLUB OF OXFORD
Oxford, Pa.

Model Aeroplane Building as a Step to Aeronautical Engineering

The accompanying drawing shows clearly the construction and method of fastening or rigging the main planes.

The planes are built up of wood, reed and thin strips of bamboo. The main spars are made from strips of ¼ x ⅛-inch spruce, the edging is ⅛-inch round reed and the ribs are made of two strips of bamboo laid one over the other to form a double surface rib.

To construct the main plane lay the two main spars the distance apart as given in the drawing and fasten the bottom part of the ribs in place, with thread and glue. The bamboo strips should be as thin as possible to save weight, because being of double surfaced construction it would be an easy matter to construct the wings, too heavy to fly, if the ribs were cut thick.

When the bottom parts of the ribs are fastened in place bend to the shape shown in the cross section at the left hand bottom of the drawing.

Next fasten the reed edging in place laying it on the top of the rib pieces at the ends. The tips of the wings should be bent to a convenient and attractive curve, and the main spars should be tapered from ¼" to ⅛" at the ends and the reed fastened to them.

It will be noticed that a space is left out of the wing plan in the drawing to show the shape and size of the ailerons. It is optional whether the wing is made with the ailerons cut out and movable or the wing is made solid, that is having no ailerons, I would prefer the former as the model would then be able to perform different stunts in the air by moving the ailerons up or down, etc.

Should the model builder prefer to make the wing with ailerons he should cut off the two end ribs on each side of the plane at the rear main spar as shown at the right side of the plan.

The aileron is then made to conform to the shape of the trailing edge of the plane.

When the bottom parts of the ribs are fastened in place and bent to the desired curve, the top part of the ribs should be cut and bent to the proper curve. Notice that the bottom rib strips lie under and are fastened to the reed but the top strips do no lay over the reed but butts against the reed and the ends are fastened to the under strips just a fraction of an inch before meeting the reed edging.

The bottom plane is constructed in the same way, but the model builder should be careful to construct one right and one left side. There are no ailerons in the bottom wings the ends have a large curve at the trailing edge.

The method of construction is shown at the right hand top of the drawing and is clear enough to show the method of spacing and fastening the ribs, spars and reed.

The Curtiss machines have a center panel over the fuselage the wings being made into two pieces and fastened to this section, but for ease of construction I have made the plane in one piece and I think the model builder will find it better when fastening to the model.

The covering is next put on. Silk or paper can be used, but the former will give the best all around service and make the neatest job.

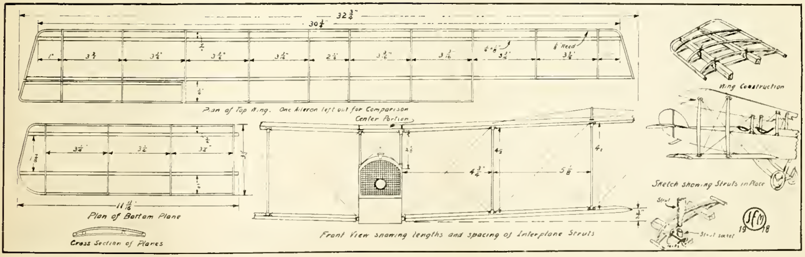
To fasten the covering to the planes use hot glue. This is made in a small glue pot which may be purchased at almost any hardware store. The glue is boiled in water until it reaches the consistency of paint. Apply a little to the edging and place the silk in place holding it until glue sets. The silk should be fastened at the ends first and stretched as tightly as possible. When set it is an easy matter to fasten along the entering edge and then along the rear edge taking care to pull up tight so no wrinkles appear.

When covering the wings the bottom side of the top planes and the top of the bottom planes should be put in place first as it is then an easy matter of fastening the strut sockets in place, after which the other sides may be covered.

The struts are made of spruce ¼" x ⅛" and made to a streamline shape the bottoms being rounded to ⅛" to fit into the ⅛" strut socket which can be purchased at a model supply house. The lengths and spacing of the struts can be had from the front view at the bottom of the drawing. It will be noticed that the wings have a slight dihedral angle. The angle is shown by the broken line under the right bottom wing.

A sketch of the rigging of an aeroplane is shown at the right. The fuselage of the model made also to be covered with silk.

(*To be continued*)

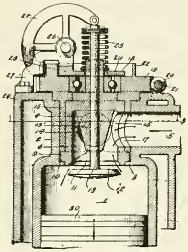


RECENT AERO PATENTS

BY WILLIAM N. MOORE

1,259,728. ENGINE VALVE MECHANISM. Samuel Frank Eastman, Petersburg, Ill. Filed Mar. 12, 1917. Serial No. 154,322. (Cl. 123—79.).

In an engine valve mechanism, the combination of a cylinder having an intake and exhaust located in approximately the same plane, a passage member fitting into the outer end of tbe cylinder and having ports for communication with said intake and exhaust, a sleeve valve controlling communication between said ports and said intake and exhaust, means for rotating said sleeve valve, a second valve for controlling communication between said passage member to the cylinder, said second valve having an operating seam exploding through said passage member and the exterior thereof, and means for operating said stem including a cam rotatable bodily with said sleeve valve.



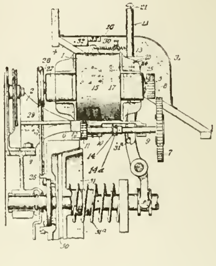
In the engine valve mechanism, the combination of a cylinder having an intake and exhaust in substantially the same transverse plane, a passage member fitting into the outer end of said cylinder and having ports opposite said intake and exhaust, a rotary sleeve valve surrounding said passage member and having a port for alternate registration with the aforesaid ports, a gear carried by the outer end of said sleeve valve and means for rotating said gear, an annular flange carried by the outer side of said gear and concentric therewith, said flange having a cam, a valve for controlling communication between the inner end of the passage member and the cylinder, said valve having a stem extending through said passage member to the exterior thereof, and a rocker arm operated from the aforesaid cam for controlling said stem.

In an engine valve mechanism, the combination of, a cylinder having an intake and exhaust in substantially the same plane, a passage member fitting into the outer end of said cylinder and having ports disposed opposite said intake and exhaust, a rotary valve sleeve surrounding said passage member and having a port for alternate registration with the aforesaid ports, means for rotating said sleeve valve, a cam rotatably bodily with said valve, a rocker arm controlled by said cam, a second valve controlling communication between the passage member and the interior of the cylinder and having a stem extending through said member to the exterior thereof, said stem engaging said rocker arm, a spring surrounding the outer end of said stem for normally closing the valve thereof, a bracket upon which said rocker arm is mounted, and an extension on said bracket serving as an abutment for said spring.

1,259,744. ENGINE-STARTING SYSTEM. John H. Hunt, Dayton, Ohio, assignor to The Dayton Engineering Laboratories Company, a Corporation of Ohio. Filed July 3, 1914. Serial No. 848,902. (Cl. 172—239.)

In an engine starting device, the combination with an engine and a starting device therefor; of a controlling member for said starting device; a lever associated with said controlling member; means normally engaging said lever to latch the controlling member in normal position; and means operaable by said lever when operated to unlatcb the controlling member to effect an initial operation of the starting device.

In an engine starting system, the combination with an engine, and a starting device therefor; shiftable elements for connecting tbe starting device and engine together for starting purposes; a control lever for shifting said shiftable elements; means for imparting an initial operation to tbe starting device to facilitate the shifting of said elements; and means for locking the said control lever in inoperative position, except when the means for imparting the initial movement of the starting device is operated.

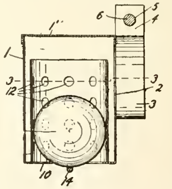


In an engine starting device, the combination with an engine, including a clutch controlling member; of a starting device for said engine, including an electric motor having circuit connections; means for coupling the electric motor and engine together for starting purposes; and a starting lever normally locked in inoperative position by means of the clutch controlling member, said starting lever being operable to make the motor circuit connections and to shift the means for connecting up the engine and motor together, when the clutch controlling element has been shifted into position to tbrow out the engine clutch.

In a starting system for engines, the combination with an engine, including an electric member; of a starting device, including an electirc motor having circuit connections; switches for making and breaking said motor circuits; latching means for preventing the operation of one of said switches previous to the operation of another of said switches; and a mechanical interlock associated with the clutch controlling member for preventing the operation of one of said switches until the clutch controlling member has been actuated to throw out tbe engine clutch.

1,259,858. GAS-SAVER FOR INTERNAL-COMBUSTION ENGINES. John L. Hague, Los Angeles, and William A. Bradley, Tropico, Cal.; said Hague assignor to said Bradley. Filed Sept. 16, 1916. Serial No. 120,528. (Cl. 137—32.)

In combination with a carbureter for an internal combustion engine, an air inlet device connected to admit air to the inlet of the carbureter and comprising a vertical tubular member open at its lower end to the outer air and provided with lateral aperture means communicating with the interior of the carbureter, and a valve member slidable in said tubular member to close more or less of said lateral aperture means, so as to provide for substantially constant drop of pressure at the valve at different speeds and stop means for preventing complete closure of said lateral aperture means by said valve member.



(*Continued from page* 1112)

Home for Italian Aviators

Hon. Guiseppe Bevione, head of the Italian aviation mission in this country, has leased the home of Mr. Lee Stubblefield, at 2356 Massachusetts Avenue, Washington, D. C., for the duration of the war. He will have with him there some of the Italian officers and other members of the mission associated with him.

Canadian Aviator Receives New Honors

Montreal, Aug. 5.—Maj. William Bishop, the Canadian aviator whose active fighting career was recently interrupted by his appointment to the British Air Board, has been awarded the distinguished flying cross in recognition of his destruction of 72 German aeroplanes. He destroyed 25 German machines in 12 days, five of which he brought down on the last day of his active service.

Already possessing the Victoria Cross, the D.S.O. with a bar, and the Military Cross for attacking single handed a German aerodrome and destroying forty-seven enemy aircraft, Major Bishop's latest honor was characterized in orders as "given to the most successful and most fearless fighter in the air," whose "value as a moral factor to the air force cannot be overestimated."

Aeroplane Mail Service Between Air Schools

Austin, Tex.—An aeroplane mail service has been established between Kelly Field at San Antonio and the Government School of Military Aeronautics at Austin.

The air line distance between the two terminals is about seventy miles. There is a considerable amount of official communication between the officers of the two training camps and some of it is of such a pressing nature that it was found necessary to adopt the use of the aeroplane for carrying tbe letters instead of depending upon the slow movement of the mails by train. The mail by aeroplane is delivered in a little more than an hour from one terminal to the other, which is about as good time as is had by ordinary telegraph service.

It was at the school of military aeronautics here that most of the Kelly Field students received their ground training. They come over to Austin in flocks of as many as fifteen in one formation each day and it is customary for them to make an aerial visit to the institution where they received their twelve weeks' course of ground training and to do all kinds of daring stunts above that school for the edification of the prospective flyers who are there at the time.

Army Aviator Fly Caproni Plane

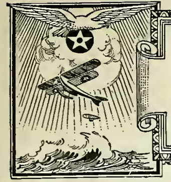
For the first time since their construction, an Italian Caproni biplane of American make with a Liberty motor installed, was flown by four American Army aviators on July 13 at Mineola, L. I. Tbe test was witnessed by all the Italian officers at the field and was by permission of Major C. K. Rhinehart, S.C., U.S.A., commanding officer. Lieutenant E. L. Williams, C. B. McCullough, E. O. Barr and A. T. Watson, A.S., S.C., took the machine for a preliminary run, then it flew a half hour with the four American pilots alternating in driving. They handled the machine perfectly. When the engine was shut off the big plane landed as easily as one of the lighter type Curtiss machines. The Liberty motor did all and more than was asked of it.

Our Air Schools "Over There"

The New York "Times" special correspondent, in conclusion of the first authorized description of the work accomplished by the American forces since tbey landed in France, writes of visits he paid to several of the new American flying schools. He says:

"I am convinced that these American boys will rank among the best fliers in combat work at the front. On a recent Sunday morning at one of the flying centers I visited there were perhasp sixty machines in the air at once, some practising in formations, some doing ordinary stunts, some advanced acrobatics, and others hard at combat work.

"At another point some distance away I was equally impressed with both the work in progress and the working plans of one of the extensive so-called 'air service production departments.' This important center of activity, which is typical of several now in course of construction, covers a tract of land over six miles long by a mile and a half wide, where the construction, testing, and repair of American aeroplanes will soon be going ahead full tilt on a scale never before known. The work splits into four main divisions—transportation, production, construction, and supply."



NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eherts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Note 1—Report to points mentioned in order named for temporary duty.

Note 2—Report to Army Balloon School, Lee Hall, Va.

Note 3—Report to Mechanics Training School, St. Paul, Minn.

Note 4—Report to Aviation General Supply Depot, Philadelphia, Pa.

Note 5—Report to Goodyear Tire and Rubber Co., Akron, Ohio, and wire DAP.

Note 6—Report to Curtiss Aeroplane Co., Buffalo, N. Y., and wire DAP.

Note 7—Report to 312 the Squadron, Bolling Field, Anascostia, D. C.

Special Orders Nos. 70 to 73, Inclusive

A

Anderson, Richard M.	FRF
Aleshouckas, Joseph W	SLR; TFT
Andrews, Frank M.	KST
Adams, Stanley B.	PWM
Aehle, Truman Homer	SLA; CRI
Adams, Frank D.	DIK
Acton, Gene W	DIK
Abernathy, Claude W	PWM
Ammel, Roy W	FRF

B

Beehler, Charles H.	DIK
Bromley, Thomas Roden	SLA; CAF
Butterfield, Harold H.	FRF
Baker, Kenneth C.	SLR; CAF
Baskey, Earl F.	SLR; CAF
Byron, William D	SLR; CAF
Becker, Albert Francis	SLA; WFO
Bush, Lyle K.	SLA; WFO
Byrns, Benjamin M.	SLA; WFO
Boyd, Linn	SLA; WFO
Buntin, Robert Bobson	SLA; WFO
Brinker, Tom Joseph	SLA; RSD
Brokmeyer, Albert F.	FRF
Blood, Harold E.	FRF
Bates, Hervey	SLA; BFT
Bailey, William N.	EOT
Barrett, Arthur Ernest	SLA; KST
Bell, Ned C.	WFO
Brown, Reed Bracken	SLA; SBI
Brissell, Willard S.	TFT
Barrett, William J.	SLR; TFT
Baker, Joseph B.	FRF
Bardon, Paul E.	SLR; CAF
Bleakley, Wayne W	CAP
Beardsley, Charles B., Jr.	SLR; CAF
Bermant, Lester C.	FRF
Brown, David K.	SLR; TFT
Borden, Joseph L.	FRF
Boyd, Wilfred Roswell	SLA; BFT
Burdick, Lorence B.	PWM
Barrett, Vinton E.	PWM
Beehler, George H.	PWM
Bisgood, Frederick W	PWM
Bockus, Harry N.	PWM
Brown, Harold L.	PWM
Buchanan, James P.	PWM
Burns, George R.	PWM
Buchanan, James B.	SLR; SRC
Batt, Joseph S.	CJW
Black, Walter Lorraine	SLA; HHN
Boggs, William G.	BST
Brooks, Charles Henry, Jr.	SLA; CAF
Baird, John L.	SMM
Bryan, Edward D.	SLA; WFO
Brown, Clifford A.	FRF
Bryant, Fred L.	SLA; BST
Beisel, Harold N.	DIK
Buswell, Walter Scott	SLA; PMT
Burns, Le Roy W	FRF

C

Cobe, Harry H.	FLR
Camp, Victor F.	FLR
Cutlin, Robert Willard	SLA; LHV
Carey, Allan James	SLA; SBI
Caulfield, Sydney W	FLR
Cromelin, Paul B.	FLR
Crofoot, Edward Brooks	SLA; FOB
Cameron, David	FRF
Casey, Mathew Arthur	SLA; CFT
Carney, Norfleet Lynn	SLA; CWT
Connelley, Robert M.	DIK
Crocker, Clarke Wilkins	SLA; RSD
Clark, McKinley F.	SLR; TFT
Cleveland, Chester E	CWT
Carter, Charles F.	SLR; CAF
Camhlin, Roy W	PWM
Clark, Willard S.	PWM
Colton, Earl G.	PWM
Conlogue, John A.	PWM
Cooper, Edwin J.	PWM
Cummings, Charles M.	PWM
Christopherson, Fred C. O.	DIK
Caspary, Delo Harvey	SLA; CWT
Crowell, Robbins Pentecost	SLA; PMT
Caffery, James Parkerson	CPA; DAP
Curtis, Tooth S.	SLA; RSD
Cecil, Eugene	SLA; KST
Clarke, William B.	DIK
Cheak, Chester W	FRF
Connelly, Robert Michael	SLA; CAF

Christensen, Ezra Allen	SLA; CRI
Clairhorne, Harry C.	DIK
Corkille, John D.	DIK
Cogan, James E.	KST

D

Dunkin, Russell VanCleave	SLA; HHN
Down, Ralph	ALF
Delaplane, Edwin Sease, Jr.	SLA; SBI
Dahlem, Earle Clifford	SLA; KST
Druffner, Karl Martin	SLA; PMT
Duthie, Rohert Douglas	SLA; SBI
Day, Curtiss LaQ.	FRF
Durfee, Charles Pierce	SLA; SBI
Dalton, William Edward	SLA; TFT
Denny, Cary F.	PWM
Denho, George W.	CWT
De Wald, William N.	DIK
Dillon, Lynn Gilbert	SLA; CRI
Dunlap, Daniel David	SLA; CRI
Deadman, William W.	DIK
Davis, Claud A.	DIK
Delaplane, Edwin S., Jr.	BST

E

Estep, Edwin R.	SRC
Eskind, Ernest	DAP
Eastman, Andrew James	SLA; KST
Ervin, Rohert G.	FRF
Evons, Leonard Reese	SLA; ELA
Edrington, John Price	SLA;CAF
Espey, John E.	FLA
Ebright, Carroll M.	CWT
Elston, Welsome B.	FRF
Engstrom, Theodore Albert	SLA; RSD
Eby, Samuel Hilary	SLA; CFT

F

Fagan, Edward T.	ALF
Foard, John Whithy Jefferson	SLR; ALF
Fitzpatrick, William S.	FRF
Fiester, Ritner I.	SLA; WFO
Fuller, Edward R.	PWM
Frisbie, Hallet B.	PWM
Frederick, Karl A.	FRF
Fleming, Carl Sumner	SLA; PMT
Falcon, Guilford W.	FRF
Filson, Harry Raymond	SLA; RSD
Fay, George H.	PWM
Faust, Leroy H.	PWM
Fields, Frank E.	PWM
Finn, Matthew E.	PWM
Fry, John O.	PWM

G

Goldshorough, Paul	CAF
Goetz, Alvin C.	FLR
Gore, William Martin	SLA; LDT
Gaffney, Dale Vincent	SLR; FRF; PMT
Graham, Leland J.	CAF
Gale, Harold D.	PWM
Gay, Ernest H.	PWM
Giles, Barney M.	SLR; TFT
Gordon, Harold R.	SLR; CAF
Gallup, Burton A.	PWM
Garoni, Rudolph	PWM
Goode, Henry W.	PWM
Gooding, Carlos C. V.	PWM
Goree, Roger C.	PWM
Gray, Ralph C.	PWM
Grout, Lewis William	CPA; DAP
Grant, Charles Hampson	SLA; KST
Garrigan, Louis George	SLA; GLC
Glennon, Herhert L.	DIK
Glanz, Carl C.	PWM
Graham, Arthur S.	PWM

H

Howad, Doctor Marmaduke	SLA; LDT
Henderson, James Max	SLA; TFT
Hawkins, Ivan	FRF
Herron, Rohert McKisson	SLA; LDT
Harvey, Raymond	SLA; TFT
Hungerford, Carleton Couch	CPR
Harper, Maitland C.	FRF
Hill, Lon C., Jr.	FRF
Halsey, Wilmot Benjamin	SLA; PMT
Hallam, Harry	PWM
Hajek, William J.	PWM
Hays, William W.	PWM
Holland, James C.	FLR
Henderson, William A.	FRF
Hardy, Richard L.	PWM
Hughes, Herhert	MJR
Hillman, Charles A.	FRF
Hodason, Harold C.	DIK
Hillix, Albert F.	FRF
Hadeen, Edward A.	Note 3
Henderson, Denny Edwin	SLA; CRI
Hoover, Chester A.	DIK
Hilton, William T., Jr.	CAF
Haddorff, Carl L.	PWM
Headley, Mervin E.	PWM
Heaney, Francis C.	PWM
Hughes, Edwin D.	PWM
Hueffner, Frederick W.	DIK
Hickman, James B.	DIK
Hubhard, Lyle	DIK
Haggerty, Stewart A.	DIK

J

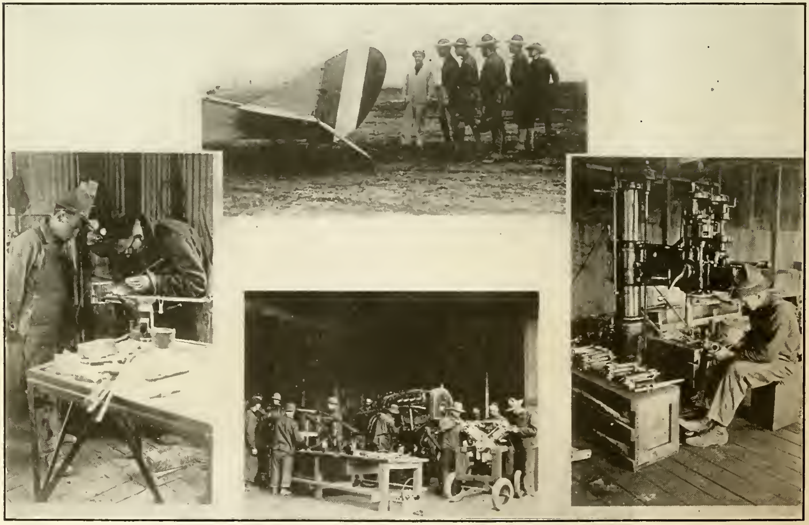
Johnson, Sydney Kent	SLA; PFO
Joyes, Morton Venable	CPR
Jackson, Oliver P.	FRF
Jeffries, John M.	SLR; CAF
Jones, Jay S.	SLR; CAF
Johnston, Neil S.	FRF

K

Kent, Everett Frank	SLA.; CWT
Kauffman, Carl R.	PFO
Kirkendall, Freeman B.	MAT
Kennedy, Rohert Joseph	FLA; DAP
Kuehl, Adolph Alexander	SLA; BFT
Kendall, Harry Adelbert	SLA; GLC
Kirby, Maxwell	DMA
Krigger, Augustus H.	FRF
Kintzing, Edward Oliver	SLA; TFT
Kennedy, James Alexander, Jr.	SLA; TFT
Kyle, William F.	PWM
Kilbane, James A.	PWM
Kievlan, Charles E.	FRF
Kimball, Dan A.	SLR; CAF
Keller, Clarence K.	SLR; TFT
Kritzer, Henry E.	DIK
Keenan, Lorenzo Joseph	SLA; KST
Kenney, Cornelius J.	PWM
Kier, Samuel M.	PWM
Kirhy, Samuel B., Jr.	PWM
Kloke, Carl P.	PWM
Kipp, Eugene H.	DIK

L

Long, Howard Vassar	SLA; SBI
Lovejoy, Kenneth Frick	SLA; TFT
Lanagan, William Michael	SLA; PFO
Long, Leonard F.	MAT
Lamb, Howard E.	EOT
Langmead, Harry Willard	SLA; CWT
Littlejohn, Harry F.	CPR
Lea, Royal B.	FRF
Langley, John A.	SLR; CAF
Lockwood, Lyman B.	FRF
Lemley, Russell W.	FRF
Lewis, Mason A.	CPR
Longstreet, Jack Y.	FRF
Lankey, Francis I.	PWM
Lawnin, Nelson	PWM
Lawton, Merritt L.	PWM
LeVitt, Morse D.	PWM
Lewis, Harold M.	PWM



Previous to his first trip in the air in a dual control plane, each flying cadet inspects his plane, just as he does later on when he gets his own machine. In squads of six, the cadets accompany their instructor who goes over the plane explaining the operation of the controls and engine. Then he takes them up one at a time

While they are not flying the cadets watch their companions at arms, and endeavor to learn from their mistakes just what not to do. All the student aviators are instructed in the care and repair of their "ships", working at different times in the shops. A lesson in brazing and welding is being given in the left-hand picture, and a man is operating a drill in the machine shop on the left.

Engines receive close attention lest they go wrong and fail thereby endangering the life of the cadet. If they cannot be adjusted properly they have to be taken out of the machine and sent to the shop for overhauling. But in a short time a new engine is installed in the plane and away it goes.

Lile, Richard L.	PWM
Locher, Edward O.	PWM
Loder, James A.	PWM
Logan, William L.	PWM
Lewis, James C.	Note 2
Landan, Charles H.	BFT
Leisure, George S.	DIK

M

Martins, Algernon F.	SLR; CGC
Mitchell, Kenneth D.	SLR; CGC
Matthews, James C.	FRF
Miller, Edward F.	FRF
Mitchell, Eliot W.	FRF
Moore, John S.	FRF
Morgan, Edward Frederick	SLA; SBI
Maxwell, Robert R.	FRF
Merritt, Edward K.	FRF
Morner, Edward C.	FRF
Molleson, Gilbert C.	TMA
Mitchell, Clark G.	FLR
Miller, Max B.	DIK
Macks, Robert G.	DIK
Morrisy, James E.	CWT
Madden, John H.	PFO
Martin, Douglas Edison	SLA; DAP
Mitchell, Philip C.	CAF
Marshall, Howard P.	PWM
Matthews, David R.	PWM.
Miller, Harry B.	PWM
Morrissey, Raymond A.	PWM
Mercer, Robert A.	SLA; DAF
Murray, John Gaines	SLA; CRI
Mahoney, Vincent Daniel	SLA; VBW

Mc

MacKenzie, William J.	SLR; TFT
McMullen, Alexis B.	CWT
McMahan, John	SLA; HHN
McDonnell, John C.	DMA
McMichael, Lawrence D.	SLR; CGC
McGeary, John Elliot	SLA; SBI
MacClellan, George H.	FLR
McGinty, Daniel Joseph	SLA; CRI
McMackin, Albert F.	SLR; CGC
McClymond, Ernest L.	SLR; CGC
MacHardy, Alexander Charles	SLA; SBI
McFarland, John J.	CRI
McArthur, John Knox	SLA; TFT
McIntosh, Lawrence W.	WFO
McKeever, James Lawrence	SLA; DAF

N

Norris, George L.	MJR
Nelson, Erik H.	FRF

O

Oaks, Harry Charles	SLA; PMT
Ong, David G.	CPR
Organd, John D.	FRF
Overmire, Wilfred J.	FRF
Oliphant, Rufus A.	SLR; TFT
Oliver, Walter L.	CWT
Officer, Herbert G.	DMA
O'Leary, Arthur C.	FOB

P

Patton, William D.	SLR; CGC
Pritchartt, Alexander V.	SLR; CGC
Piper, Raymond Alden	SLA; PMT
Pinckney, Jerald J.	SLR; TFT
Polkinhorn, William O.	SLA; DAP
Phillips, Charles A.	SLA; GLC
Pierce, Harold	ALF
Pearson, Laurence H.	SLA; GLC
Pugh, Harvey Meredith	SLA; RSD
Pfeil, Paul Francis	SLA; GLC
Powers, Perry Montgomery	SLA; SMM
Pinkham, Henry Palmer	SLA; CRI
Price, Albert Chanoweth	SLA; WFO
Payne, Franklin Storey	SLA; KST
Palmer, Charles Harlan	CRI
Pierson, Ellis Headley	SLA; CWT
Peterson, Lloyd Julius	SLA; SMM
Powderly, Daniel William	SLA; CRI
Pavey, Smith Wendell	SLA; GLC

Uncle Sam's embryonic aviators being inoculated against typhoid fever and vaccinated against smallpox. This precaution is taken to protect the men's health almost as soon as they enter the service. Three inoculations are necessary. They are administered at intervals of about ten days. The immunity lasts about two years. The above photograph was taken at one of the aviation camps in the United States

Powers, Edward Michael	SLA; KST
Phelps, Edward G.	DIK
Peterson, Frank L.	DIK

R

Reyerson, Wallace Eugene	SLA; CRI
Ritchey, Silvester Douglas	SLA; EOT
Russell, Howard Fraser	SLA; DAF
Rollins, Joseph R.	APR
Rasmussen, Harry	SLA; FOB
Reynolds, George H.	PWM
Redin, Roy W.	PWM
Robertson, Archie M.	PWM
Randall, Rex Roland	SLA; RSD
Roehl, John F.	CGC
Robertson, Charles B.	FRF
Reinberg, George E. A.	DMA
Richards, John Preston	SLA; PMT
Runkle, Charles Grossman	SLA; CRI
Reily, Henry Harold	SLA; KST
Roche, Walter	SLA; CWT
Rust, Franklin M.	FRF
Rausch, Lorenzo August	SLA; TFT
Ramseur, Benjamin F.	CWT
Rowe, Hiram H.	FRF
Russell, Edward Clarendon	SLA; Note 5
Ruckstell, Grover Edwin	CPA
Reamer, Thomas Murray	SLA; WFO
Rundlett, Nelson Smith	SLA; EOT
Rust, Franklin M.	EOT
Robbins, Ralph B.	PWM
Rogers, Henry S.	PWM
Romans, Edgar D.	PWM
Ronan, John A.	PWM
Roos, Camil N.	PWM

S

Stahlein, Francis John	SLA; TMA
Stumpf, Charles Briton	SLA; KST
Smith, Howard Egbert	SLA; TFT
Smith, William H.	FLR
Semple, John C.	FRF
Sproull, William Cargill	SLA; CRI
Strickland, William Kimball	SLA; TMA
Studley, Ralph Austin	SLA; TFT
Strain, Cranford L.	FRF
Smith, Paulding	PWM
Sherman, Alza C.	PWM
Sutherland, Alexander Gordon	SLA; PMT
Shaw, William F.	PWM
Sloniger, Eyir L.	PWM
Spencer, Bonifield M.	PWM
Speer, Dallas M.	PWM
Spilman, Louis	PWM
Stephenson, Arthur W.	PWM
Still, Leslie E.	PWM
Stout, Sidney A.	PWM
Suthers, William G.	PWM
Swift, Charles P.	PWM
Sansbury, Dudley Gordon	FLR
Seawell, John Leonard	SLA; DAF
Shilt, Noble Crawford	SLA; CRI

(*Continued on page* 1134)

A night flying aeroplane. The floodlight lights up the ground to assist in landing the machine

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Tune of Casey Jones

(Apologies)

Come all you crew men, all who can,
And hear about a brave American.
Sergeant Jones was the Sky-Pilot's name,
With a twin-six Liberty he won his fame.

Sergeant Jones,
He mounted to his Liberty,
Sergeant Jones,
With his sky map in his hand
Sergeant Jones he mounted to his Liberty
Bound to take a trip o'er the Hun's land.

He looped over the River Rhine,
His machine gun let out an awful whine,
The Boches knew by his engine's clank,
That the man at the wheel was that damn Yank.

He looked at his altimeter, it was low,
He looked at the rev'lut-ometer, 'twas running slow,
He turned to his observer, and he said,
We'd better climb higher or we'll both be dead.

While flying high he dropped a bomb
It fell square on Bismarck's tomb,
This made the "Flying Circus'" men rave,
Who said, "We'd fight him BUT he's too brave."

His body now lies in a little graveyard,
'Course his kin folks take it awful hard,
But he gave his life for that Liberty,
And helped make the world safe and free.

He was not a Chaplain, He was a Sergeant.

W. B. Jones,
Galveston, Tex.

Mistakes We Make

Irate Lady: That attendant over there doesn't act as couteous and obsequious as he should. I wish to report him.

Hotel Clerk: Then you'll have to write his commanding officer a letter, madam. He's in naval aviation.—*Sun-Dial.*

Lines to a Cherished Correspondent

"—and then he dropped like a plummet."—*Last line from any account of any aeroplane accident in any newspaper.*

It may be that I'll never be
A wearer of "The Wings."
Perhaps I'll never pipe the song
A fighting Fokker sings.

But if the Fates in hours to come
On me with favor stare,
And if my bit of service shall
Be bitted in the air.

I ask you, Sir, who serve the Press,
If I should ever croak,
Remember that my agile ghost
Will never take a joke.

Write in your yarn that I was punk,
And then misspell my name;
Insert a picture of my mug
Snapped at a poker game.

Add that my coat was bought "on time;"
Or say I had to bum it;
But, mister, don't for Peter's sake
Say I dropped like a plummet!

—*C. L. Funnell, U. S. N. R. F. C.*

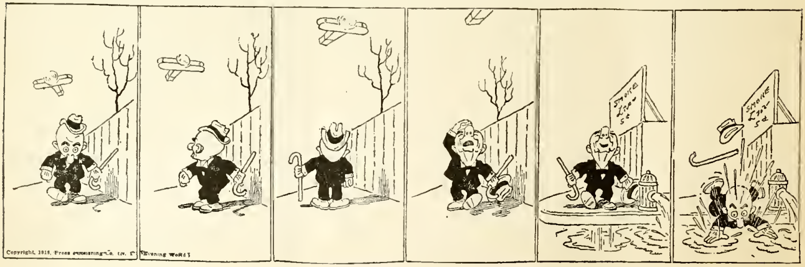
Getting Acquainted

Some day when you have nothing to do
Sit down and think of something new,
And get acquainted if you can
With the new idea of the aviation man.

You'll find a lot of interesting things
Of things you'd never found before,
In strength and weakness, heart or mind,
Of a most interesting kind.

And maybe if you look with care
You'll find some lurking powers there
To lead you to some higher plane
Out of some black cloud of rain.

J. T.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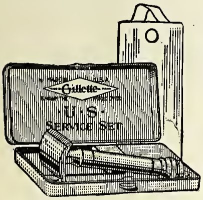
SMOKE
5¢
SMOKE
5¢

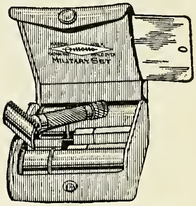
He'd Better Have Been Watching for Submarines.

—By Grindstone George (Courtesy N. Y. World)

Gillette SAFETY RAZOR



The New U.S. Service Set—A solid metal case, heavy nickel-plated and embossed with the Insignia of the U. S. Army and Navy. Strong, thin, compact: 1¾ inches wide, 4 inches long, ⅜ inch thick. 12 double-edged Gillette Blades (24 Shaving Edges). Contains a nickel-plated Gillette Safety Razor and Blade Box. Indestructible Trench Mirror inside the lid. $5



Military Set No. 18—For Uncle Sam's Officers, a Gillette Combination Set, in case of U. S. Regulation Khaki twill — nickel-plated "Bulldog" Razor; indestructible Trench Mirror fitted in pocket in lid; Shaving Brush and Stick Gillette Shaving Soap in nickel-plated Holders; two Blade Boxes; 12 double-edged Gillette Blades (24 Shaving Edges). $7

When a man lives in a place where he can't swing a cat, he comes naturally to a Gillette

The men with the colors, everywhere, know how to shave in 2x4 space—in "once over" time. They know the Gillette makes this easy. Cool, comfortable, and absolutely dependable—the *service razor* with millions of fighting men.

Have you seen the new Gillette Sets specially made for the fighting man? Two of them are illustrated on this page. They were designed by members of the Gillette Organization in the Service—men who know what the fighting man is up against.

Simple and compact, fit the pack, the pocket or the ditty box. No strops or hones to clutter up the kit. Blades always sharp, always ready.

No Stropping—No Honing. When a man wants new Blades he can get them in any Post Exchange, Ship's Canteen, or Y. M. C. A. Hut, here in America or overseas.

Our Paris office carries stocks—is constantly supplying the American Expeditionary Forces. Gillette Safety Razors and Blades on sale everywhere in France, England, Italy, and the Eastern battle fronts.

Gillette Safety Razor Co.
of Canada, Ltd.
73 St. Alexander St.
Montreal, P. Q., Canada

Gillette Safety Razor Societe
Anonyme
17 Bis, Rue La Boetie
Paris, France

Here's the Way to get 100% Efficiency Out of Your Gillette

Try this when you shave tomorrow morning. Lather the beard thoroughly, and rub well in—that's essential with any shave.

Put in a new blade and screw the handle down *tight*. If you want a specially close shave, *unscrew* the handle a *part turn*.

Hold the razor *naturally* and *easily*, and tilt the handle so you can just feel the blade engage the beard.

Then shave with short slanting strokes. It doesn't require any brute force to shave with a Gillette—the razor does the work.

Gillette Safety Razor, Ltd.
200 Great Portland St.
London, W., England

A. G. Micheles
53 Liteiny, Petrograd, Russia

Vedova Tosi Quirino & Figli
Via Senato, 18
Milan, Italy

Gillette Safety Razor Company
Boston Mass·U·S·A·

TO KEEP THE ALLIES' EMBLEM SUPREME IN THE SKIES!

Not only to maintain aerial supremacy over No Man's Land, but to carry the war to Berlin itself—this is the work to which we are dedicated.

STANDARD AIRCRAFT CORPORATION
ELIZABETH NEW JERSEY
A REAL FIGHTING INDUSTRY

Member of Manufacturers' Aircraft Association, Inc.

(*Continued from page* 1131)

Smith, Arthur H.	FRF
Stuart, George D.	FRF
Spiner, Louis H.	FRF
Swain, William M.	CPR
Stoffer, Charles T.	FRF
Schenck, John T.	FRF
Symons, Thomas W.	CWT
Scott, Paul C.	SLR; CGC
Schell, Harold Wilbur	SLA; WFC
Spooner, Malcolm G.	SLR; CAF
Sherwood, Lyman W.	FRF
Strother, Samuel P.	FRF
Simpson, John L.	PWM
Sibley, Frederick Merrill	FLA; DAP
Schroeder, Rudolph W.	WFO
Simons, John W., Jr.	DMA
Shaver, George Derrick	SLA; TMA
Saunders, John M.	PWM
Severson, Thor J.	PWM
Slater, Joseph M.	PWM
Smith, Wesley L.	PWM
Starkweather, Ralph	PWM
Steedman, Charles R.	PWM
Swanson, Leonard F.	PWM
Spicer, Orville William	SLA; CFT
Smith, William	DMA

T

Tipton, Andrew R.	PWM
Tracy, Ray P.	PWM
Twining, Albert C.	PWM
Tyree, John W.	PWM
Thieme, Robert B.	FRF
Thurston, William H., Jr.	CPR
Townsend, Edward S.	SLR; CAF
Towner, Walter Landon	SLA; KST
Teague, Newton Nesbitt	SLA; LHV
Tatnall, Emmett R.	Note 7

W

Wright, William M.	PWM
Wright, Joseph H.	PWM
Woodruff, James A.	PWM
Winch, George A.	PWM
Wilber, Harold C.	PWM
Webb, Sigel G.	PWM
Walton, John M.	PWM
Watkins, Lowry	PWM
Wilson, Thomas Addis Emmet	SLA; PFO
Weddington, Leonard Dickson	SLA; TFT
Webb, Harold W.	ALF
Weightman, Harry Emerson	SLA; CWT
Welch, Paul R.	MAT
Wharam, John Joseph	SLA; KST
Winston, Frederick H.	FRF
Woolson, Lionel M.	CAP
Waring, Charles T.	CGC
Wachtell, Philip A.	EOT
Wimer, Frank Benjamin	SLA; KST
Walker, Lambert R.	FRF
Whitall, John	SLR; TFT
Whitescarver, James F.	SLR; TFT
Williamson, Cleburne M.	FRF
Wright, Edmund C.	FLR
Wheeler, Frank I., Jr.	FLR
Whitaker, Frederick S.	SLR; CAF
Weaver, Van J.	SLR; DIK
Wolfe, Kenneth B.	SLR; DIK
Winkworth, Eugene H.	CWT
Weiser, Victor A.	FRF
Williams, Fred J.	SLR; CAF
Wilkins, Charles H.	DIK
Wood, Benjamin F.	DIK
Wood, Robert Abel	SLA; WFO
Warner, Robert Montell	SLA; CRI
Wood, Lawrence Dresser	SLA; PFO
Whitebill, Deane W.	DIK
Williamson, Harlan Actus	SLA; CAF

Y

Young, Victor M.	DIK
Young, Samuel H.	SLR; CAF
Young, Ora W.	PWM

Kill Flies to Get Leave

Camp Wadsworth, Spartanburg, S. C.—Fifty dead flies is the price that enlisted men of the camp quartermaster's department now have to pay for a pass to come into the city. As a result, when a man wants to come into town on pleasure he purloins a few grains of sugar or some other delicacy from the kitchen, seizes his trusty swatter and sets to work.

"Do and "Don'ts" for our New Arrivals

For the new men just coming into the service from civilian life there may be many stumbling blocks ahead. A few words of advice in time often save many blunders. Through the "Fly Leaf," then, an officer of the school desires to tell of some of the "do" and "don'ts" which should be the guideposts in an army man's life.

Here are some of the more important things which you should do:

Learn immediately to obey the orders of your superiors without question. When you receive an order from one of your superiors, carry it into effect immediately, no matter whether you think it right or wrong. If it later proves to be wrong, the matter will be righted. But never hesitate when given an order, no matter what the circumstances.

Be a Gentleman

Remember that you are now a representative of the United States Government, and a member of the greatest and grandest army ever formed in the history of the world. The best and most beneficent the world has ever known. As a part of that army it is your stern duty to do all in your power to maintain its high standing, both among military men and civilians. It is the obligation of every soldier to be a gentleman at all times and to bear himself with the dignity which becomes the profession of arms.

Enter into your new work of training with a resolution that you will leave no stone unturned until you have perfected yourself in every detail of the task assigned you. Thoroughness and never ending energy will win you promotion and will give you the satisfaction of realizing a duty well performed.

Some "Don'ts"

Here are some of the "don'ts."

Do not shirk your duty, no matter how trivial it may seem. The man who does more than he is asked always gets the farthest in the end. Do not try to imitate some of the types of soldiers you may have seen in motion picture films. The modern soldier is not a wild man, nor a cow boy. He is a gentleman, going about the performance of his work as any other business man would.

Do not grumble. Times will come, some day, when things may not exactly suit you. Anyone can smile and get along when all is pleasant and easy, but remember that "the man worth while, is the man that can smile, when everything goes dead wrong." Remember that it is a part of your duty to keep up the spirits of the men around you, so bury your own worries and do your best to help the man who bunks next to you.

Teamwork Wins

Do not forget that we are going to win the war by teamwork. Fit yourself into the harness of the big army team and pull for all you are worth.

If you follow out these main principles and keep your eyes and ears open to observe the advice of your superiors in the service, your new army life will prove a pleasant one, and you, in turn, will be the better fitted to serve the cause in which we are all engaged.

March Field "Fly Leaf."

AERONAUTICAL EQUIPMENT, INC.

ISRAEL LUDLOW, *President*

EXPORT **MILL AND MANUFACTURERS' AGENT** **IMPORT**

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1 WALL STREET NEW YORK, N. Y.

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> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
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"Stood the crash better than either the machine or me."

"I wish to fall in line with the many thousands of fliers who have been singing the praise of the Resistal Goggle. On November 23, 1917, I had a rather bad crash while flying at Everman Field, Fort Worth, Texas. I may truthfully say that Resistal Goggles stood the crash better than either the machine or me, I not having recuperated from my injuries at this date.

"I feel indebted to the Resistal for the fact that my eyesight was entirely spared me, while I received other injuries in the head and face. I am enclosing the goggles which did the trick."—(Signed by a member of the Royal Air Force—name on request.)

"Saved the sight of my right eye and perhaps even my life."

"In a recent flight over this city my engine went dead while I was at an altitude of 4,000 feet. It is needless to mention the numerous conditions which affect the landing of an aeroplane, but I wish to state how the Resistal Goggles which I wore undoubtedly saved the sight of my right eye and perhaps even my life. As they are of no further use to me, I am returning them to you as a proof of your advertising statement in regard to the unbreakable lenses."—(Signed by a member of Aero Squadron at Fort Worth—name on request.)

"Believe me, I'm glad I wore those goggles."

"For your information, I was lost in the fog and had to make a landing to ascertain bearings. Sent my mechanic to nearest farmhouse, and having obtained necessary information, set out. It was a rather small field, so had to 'zume' a line of trees on edge of field. I got over the first tree O. K., but did not have enough flying speed to jump the second line. Caught in the top of a tree and completely wrecked the ship. I woke up a half hour later in a farmhouse, and believe me, I'm glad I wore those goggles."—(Signed by a Lieutenant Aviator at San Antonio, Texas—name on request.)

Is deeply grateful to Resistal after a fearful airplane fall.

"In a recent airplane fall at this field I was wearing a pair of your Resistal Goggles, which I am sending under separate cover.

When the plane struck, my head was snapped sharply forward, striking my face across the rim of the cowl. Both lenses of my goggles were broken, but one side received much of the force of the blow, and the rim of the goggle was driven into my face. The lens on this side was badly broken, but none of the glass fell out of the rim, and I did not receive a scratch from any of it.

"The man flying with me received injuries which soon after resulted in his death. A blow fell across his goggles, which were also Resistal, that broke the lenses so badly that they resembled frost-work. The particles did not fall from the rims, however, and no injury was received from the glass cutting.

"Had I been wearing any but the strongest non-shatterable glasses I would unquestionably have lost my sight. Feeling this to be true, you can understand that it is difficult for me to express just how deeply grateful I feel toward Resistal for the protection it gave to me.

"In the great majority of airplane accidents, a blow is received in the face, which makes a safe goggle imperative. I know that you have it and shall recommend it at every opportunity I have."—(Signed by a Flying Cadet at Memphis, Tenn.—name on request.)

"These glasses saved my eye."

"I am sending to you a glass from one of your pair of Resistal Goggles. On March 22, 1918, I fell in a plane, striking my head on the 'cowl' of my ship. These glasses saved my eye from probably a bad wound. I am writing to show my appreciation of your non-breakable glasses."—(Signed by a Flying Cadet at Houston, Texas—name on request.)

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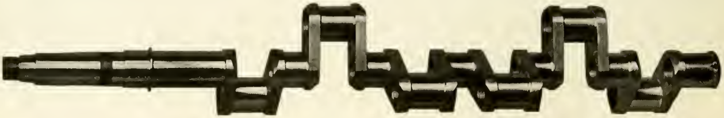

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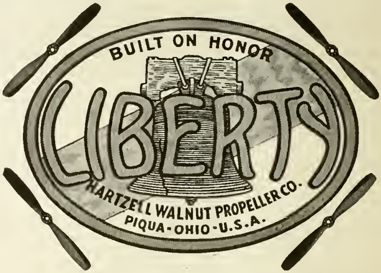
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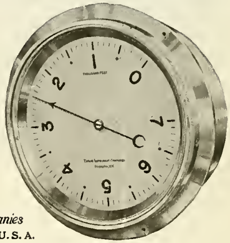

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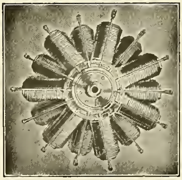

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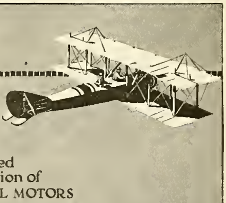

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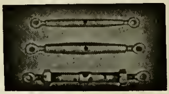

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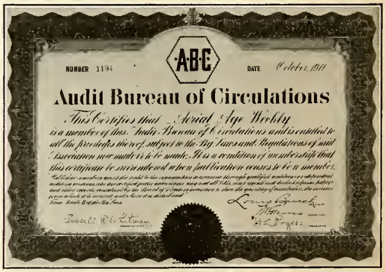

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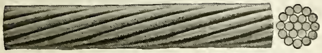

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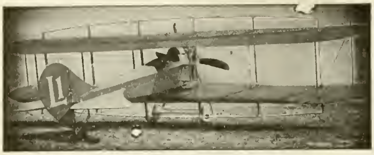

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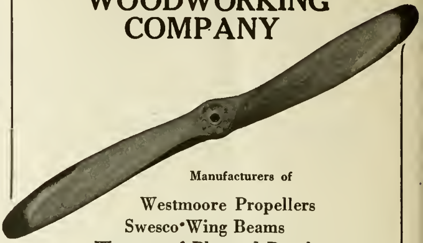

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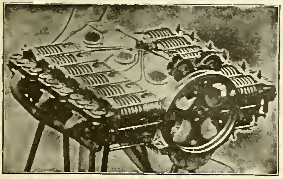

¾ top view of ASHMUSEN 12-Cylinder 105 H. P. Self Cooled Aeronautic Motor

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They actually develop over the rated Horse Power at 900 R.P.M. at propeller shaft—1800 R.P.M. at crank shaft, and are built for CONTINUOUS HEAVY DUTY.

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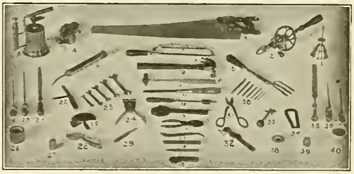

THE accompanying illustration shows the compactness and completeness of the Cooper Aeronautical Tool Box. With the assortment of tools shown the weight is only 44 lbs.—usually 60 lbs. are allowed for tools on Military machines.

After five years of flying experience these tools have been selected to meet every requirement for Aeroplane service. The size of the box is 28 x 9 x 10 inches.

Single Boxes, $100 — Discount on Quantity

The John D. Cooper Aeroplane Co.
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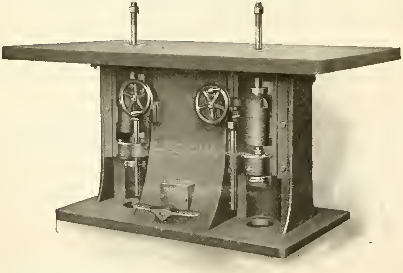

Direct Motor-Driven Double Spindle Shaper

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The ingredients in varnish are simple—usually three—gum, turpentine and oil.

The requirements of varnish are complex—in the case of the United States Signal Corps for Airplane work they number 34 specifications.

Between the three simple ingredients and the satisfaction of the thirty-four conditions there is one vital interval, and that is the process of manufacture.

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2. Protect doped linen.
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5. Be long oil varnish.
6. Resist air.
7. Resist light.
8. Resist water.
9. Resist natural gas.
10. Resist illuminating gas.
11. Have proper brushing qualities.
12. Have proper flowing qualities.
13. Have proper covering qualities.
14. Have suitable body.
15. Dry dust free rapidly.
16. Harden rapidly.
17. Be elastic.
18. Be clear.
19. Be transparent.
20. Be highest quality.
21. Match a fixed color solution.
22. Be durable.
23. Not flash below 95 degrees Fahr.
24. Not whiten under water.
25. Not dull under water.
26. Not show defects under water.
27. Stand air test during application.
28. Stand air test during drying.
29. Meet a fixed setting test.
30. Meet a threefold drying test.
31. Meet a severe bending test.
32. Be inspected before shipment.
33. Be inspected at destination.
34. Prove durable under fixed test.

Sherwin-Williams Air-Plane Rexpar meets all these requirements.

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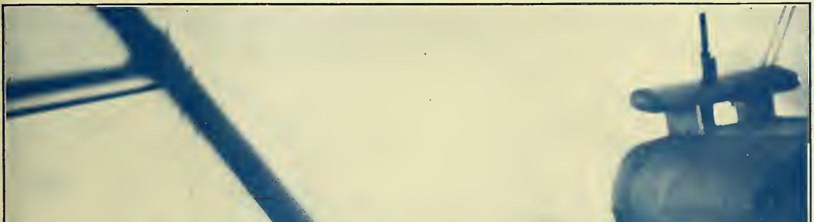
AERIAL AGE WEEKLY

Vol. 7, No. 24 AUGUST 26, 1918 10 CENTS A COPY



A flight of Handley Page bombing air cruisers taken from one of the machines. The cruiser seen in the distance is probably the leader of the V-shaped flight. The photograph was taken from the rear cockpit. The pilot and two machine gunners can be seen in the forward one. The camera has caught the swiftly revolving propeller blades

NOTICE TO READER

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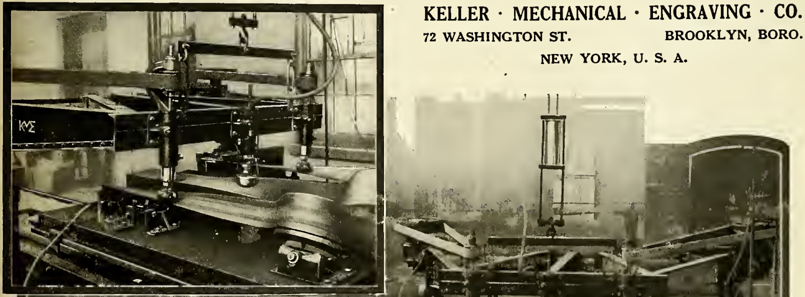
THE LATEST and beyond comparison, the BEST METHOD of SHAPING PROPELLERS

from every point of view:

ACCURACY — PRODUCTIVITY — ECONOMY — FLEXIBILITY

It has already **superceded** all other machines at the greatest aeroplane factory in America.

It is pronounced by Foreign and American experts far superior to any machine heretofore used. Produces better than five 9-foot propellers per hour.



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AERIAL AGE
WEEKLY

VOL. VII AUGUST 26, 1918 No. 24

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AIRCRAFT INSTRUMENTS
AND STILL AHEAD

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STROUD

92 *Lynite* Parts in Rolls-Royce Aviation Engine

The remarkable extent to which *Lynite* enters into the making of the airplane engine is shown by the record-breaking Rolls-Royce 12-cylinder engine now being produced in this country.

Ninety-two parts of this power-plant, which represents the work of some of the best engineering talent in Great Britain, are made of it.

These include such vital parts as crank-case castings and pistons, both of which require great strength.

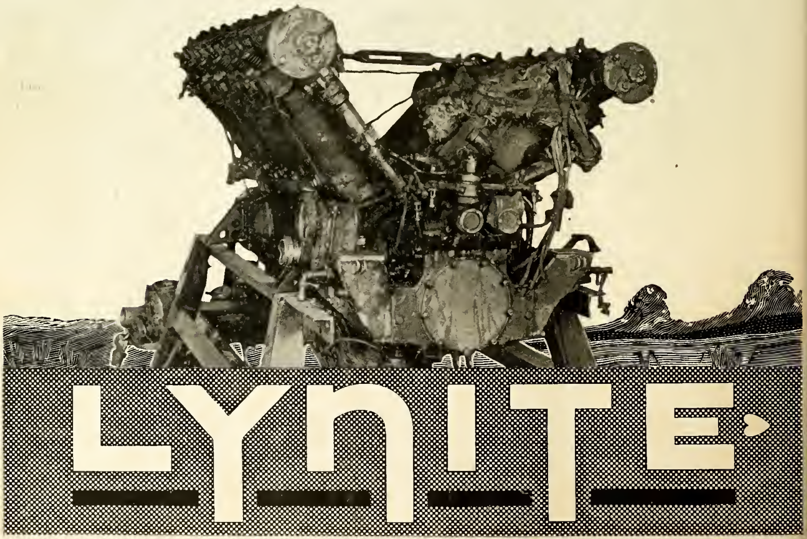
By the use of *Lynite* instead of cast-iron, Rolls-Royce engineers have saved 532 pounds without sacrifice of a single desirable quality, and, due to the exceptional heat-conductivity of *Lynite*, have obtained notable thermal efficiency.

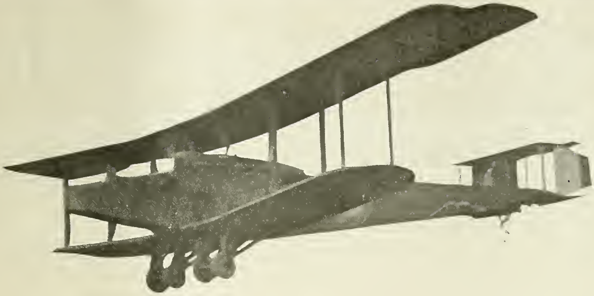
Airplanes fitted with Rolls-Royce engines hold world's records for speed, climbing, reliability, weight-carrying and passenger-carrying.

Rolls-Royce engines supplied the power for the history-making flight of a Handley-Page airplane from London to Constantinople. This exploit not only established a reliability record but hung up a new mark for weight-carrying. The total weight transported was six tons.

In making a world's record for passenger-carrying, Rolls-Royce power took 22 persons up 7,000 feet.

THE ALUMINUM CASTINGS COMPANY
LYNITE and LYNUX Castings
Eight Plants in
Cleveland Detroit Buffalo Manitowoc, Wis. Fairfield, Conn.





These *Lynite* Parts Used by Rolls-Royce

Pistons (12)
Crank Case (2 pieces)
Wheel Case
Inspection Cover (2 pieces)
Gear Box Housing
Gear Box
Cable Guide Bracket (2)
Cable Guide Bracket Cap (2)
Petrol Reservoir
Petrol Reservoir Cover
Water Outlet Junction (2)
Air Pump Crank Case Cover (2 pieces)
Idler Shaft End Cover
Oil Pipe Bracket (2)
Oil Pipe Bracket Cap (2)
Gear Case T. H. (2 pieces)
Gear Case B. H. (2 pieces)
Camshaft Drive Housing (2 pieces)
Nuts for Housing (4)
Wheel Case Cover
Rear Steady Bracket
Control Bracket (2)
Front End Control Bracket (2)
Control Center Bracket
Magneto Bracket—A Unit
Magneto Bracket—B Unit
Oil Pump Casing (3 pieces)
Oil Filter Base
Casing (2 pieces)
Suspension Bracket (4)
Suspension Bracket Cap (4)
Water Pump Bracket
Tachometer Gear Casing
Water Outlet (12)
Oil Relief Valve Casings
Water Pump T Connection
Crank Case Breather
Crank Case Breather Cap
Drain Cock Handle (2)
Induction Pipe—R. H. (2 pieces)
Induction Pipe—L. H. (2 pieces)

WHILE the invincible ranks of our fighting men move steadily forward, thousands of men and women in Standard Aircraft's factories are striving night and day—not merely to keep pace with our forces but to speed them "Onward to Victory".

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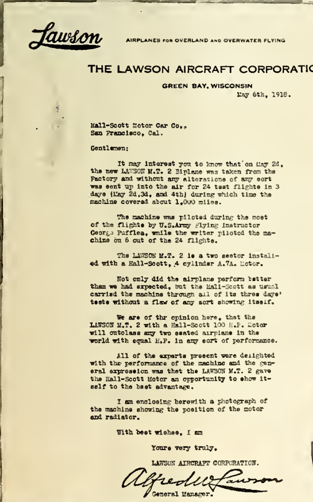
THE PILOT SAID—


Lawson AIRPLANES FOR OVERLAND AND OVERWATER FLYING

THE LAWSON AIRCRAFT CORPORATION
GREEN BAY, WISCONSIN
May 6th, 1918.

Hall-Scott Motor Car Co.,
San Francisco, Cal.

Gentlemen:

It may interest you to know that on May 2d, the new LAWSON M.T. 2 Biplane was taken from the Factory and without any alterations of any sort was sent up into the air for 24 test flights in 3 days (May 2d, 3d, and 4th) during which time the machine covered about 1,000 miles.

The machine was piloted during the most of the flights by U.S. Army Flying Instructor George Puffles, while the writer piloted the machine on 6 out of the 24 flights.

The LAWSON M.T. 2 is a two seater installed with a Hall-Scott, 4 cylinder A.7A. Motor.

Not only did the airplane perform better than we had expected, but the Hall-Scott as usual carried the machine through all of its three days' tests without a flaw of any sort showing itself.

We are of thr opinion here, that the LAWSON M.T. 2 with a Hall-Scott 100 H.P. Motor will outclass any two seated airplane in the world with equal H.P. in any sort of performance.

All of the experts present were delighted with the performance of the machine and the general expression was that the LAWSON M.T. 2 gave the Hall-Scott Motor an opportunity to show itself to the best advantage.

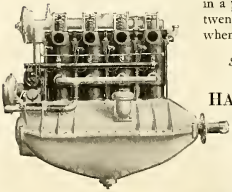
I am enclosing herewith a photograph of the machine showing the position of the motor and radiator.

With best wishes, I am

Yours very truly.

LAWSON AIRCRAFT CORPORATION.

Alfred W. Lawson
General Manager.



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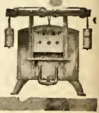
IN a period such as this, when the whole nation is confronted by serious problems, no individual effort is too small which can serve the nation's interest.

Industrial problems are particularly complex. The demand for production on an unprecedented scale is hampered by a dozen opposing factors.

The Bulletin pictured here is printed in the effort to show each factory manager how an expensive practice has arisen in heat-treating departments which can now be corrected. To remedy the practice will result in decreasing the expenses of the individual concern, while at the same time increasing the nation's output. In other words, it is equally important from the motives of profit or patriotism.



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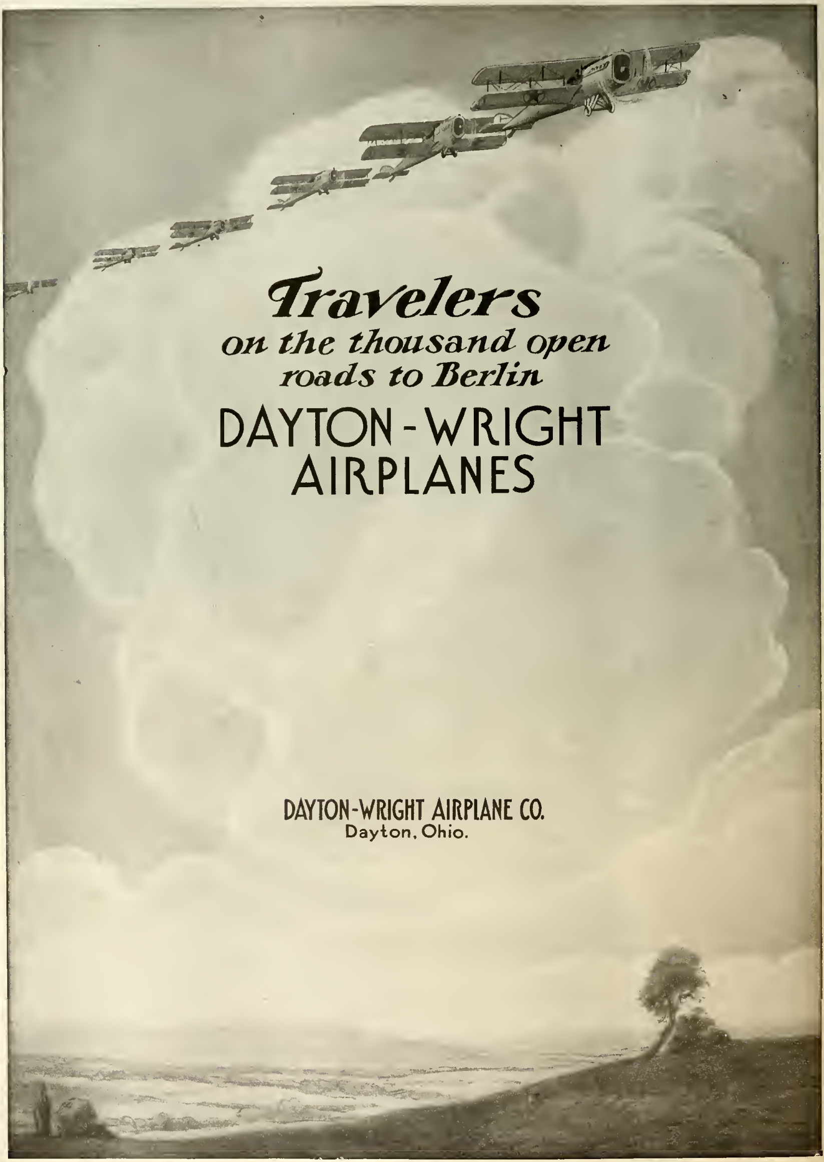
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VOL. VII NEW YORK, AUGUST 26, 1918 NO. 24

LIBERTIES OVER THE LINE

WASHINGTON, Aug. 16.—General Pershing notified the War Department today that early in August a complete squadron of eighteen De Haviland Four aeroplanes, built in the United States and equipped with Liberty motors, successfully carried out the first reconnoissance flight of American-built machines behind the German lines. They returned without loss.

In making this announcement, Secretary Baker said that Brig. Gen. Foulois of the American air service led the expedition. This was the first report from General Pershing on the performance of American-built De Havilands to be made public.

Secretary Baker said that his advices contained no other information regarding the flight except that Lieutenant Blair Thaw also was on the trip.

The announcement was considered by officers as setting at rest rumors that the De Haviland machines were not a success, and also as showing that the Liberty motors had now proved their worth in actual war conditions.

Whether the squadron was attacked was not stated. It would have been well able to take care of itself, however, as the machines, each carrying a pilot and observer, are equipped with four machine guns by a recommendation of General Pershing made many months ago. The flight undoubtedly was a scouting trip, and probably many photographs of the enemy's works were brought back.

It is assumed that the squadron mentioned is now regularly operating at the front, which means that a large number of reserve and replacement De Havilands are ready behind it. Probably General Pershing has now at his disposal the majority of the craft of this type so far produced.

Many of the criticisms of the De Haviland Fours, it is understood, are met in the design of the De Haviland Nine. With full information available this time American engineers have been able to prepare carefully for the substitution of the Nines for the Fours. The Nines do not represent any notable change from the Fours, the latter model being a refinement of the earlier machines. Both are two-seated, high speed day bombers, equipped either to fight, bomb or scout, under conditions that require high speed and easy maneuvring qualities.

GREAT BRITAIN'S REMARKABLE ACHIEVEMENT

THE reports of one year's achievements of the British Air Forces shows a most remarkable balance. Over four thousand German planes were brought down by British aviators, while the German aviators only brought down one-third that number of British planes.

A cable from London gives the figures of British achievements for the past week as follows:

"London, August 17.—The past week has been one of unexampled air fighting in the west, of which material results are disastrous and disquieting to Germany.

"The air offensive started in the very early hours of Thursday morning, August 8, when under the cover of darkness a number of British bombing squadrons dropped heavy loads of bombs upon the enemy's battery positions and other military points. Then, at dawn, British fighting scouts attacked the enemy, cooperating with the ground forces, and materially assisting their rapid advance.

"Some of the heaviest air fighting of the war took place between Albert, Amiens, and Roye Road, where the enemy's air forces were considerably augmented. Shortly after the opening of the battle forty-eight enemy machines were destroyed and seventeen others were driven down out of control. Fifty British machines failed to return. A marked weakening of the enemy's resistance in the air was speedily noted.

"During the six following days, 185 enemy machines were destroyed, and 89 driven down out of control, and 123 British machines were reported missing. The total number of German machines put out of action is 339. In addition the British bombing squadrons throughout the week have attacked the enemy's aerodromes, railways, and other communications, dropping more than 320 tons of bombs and causing great damage, both to military material and to personnel. Much valuable help was also given to the more advanced bodies of the British infantry and to the cavalry and tanks by the low-flying British scouts, which ceaselessly patrolled the battlefield, raking the already congested roads of the retreat with machine-gun fire.

A notable feature of this phase of the operations was the practically continuous bombing of the enemy's bridges on the Somme, both by day and night. In this respect the admirable experience, gained by the British airmen during the fighting on the Piave, was applied with signal success.

"It also is noteworthy that, quite apart from the air fighting on the western front and in Italy, the Balkans, Palestine, and Mesopotamia, British attacks by air upon Germany's right and left flanks have been pressed with the utmost vigor.

"Thus, in Belgium over thirty tons of bombs have been dropped, many direct hits being made and a number of destructive fires started. The Ostend docks, Bruges docks, and the mole at Zeebrugge have been repeatedly bombed with good effect, while successful attacks have also been made upon Blankenberghe, Ghistelle, Ghent, Westende, and Nieuport.

"An R. A. F. independent force has also made a number of raids into German territory, attacking the stations at Karlsruhe, munitions works at Rombach, railway triangle at Metz, stations at Offenberg and Thionville, and an enemy aerodrome at Hagenau. On August 12 a most successful raid was made upon the aeroplane and chemical works at Frankfort. Moreover, on August 11, R. A. F. contingents, working with the navy, successfully attacked a Zeppelin over the North Sea, bringing it down from a great height in flames."

SHIPPING AIRCRAFT A CARGO PROBLEM

Washington, Aug. 17.—In a statement issued tonight the War Department tells of the difficulties in connection with the shipment of aeroplanes to the seaboard and thence overseas.

"The shipment of our American-built aeroplanes has become a problem," says the statement. "It involves the transportation of an immense aggregate weight, and demands a great amount of space. Planes and their accessories are so delicately constructed that they require careful packing and strong boxing, and the boxes must be so built that they may be taken apart on the field without injuring the units, and used for repacking again, like a wardrobe trunk.

"Studies of the plane boxing and shipping problem have resulted in a material saving of lumber and shipping space. In shipping the American De Haviland bombing planes alone, for example, 644 cubic feet of space have been saved, over former methods, for every plane sent. This amounts to a cost saving of about $3,864 per plane, figuring on shipping space at $6 per cubic foot. About 1,000 board feet of lumber have also been saved in boxing by the Packing and Boxing Section of the Production Department.

"In the case of the De Haviland battleplanes, nine packing boxes are required to ship four complete machines. The gross weight of four aeroplanes is a little over 11,000 pounds, and when packed the total weight is estimated a little under 27,000 pounds. Four of the nine boxes contain front sections of the fuselage. One of them contains four rear sections, two contain two sets of wings each; one, four sets of rear contral, and one, four sets of ailerons. The total space required for four aeroplanes so crated is 3,547 cubic feet. In addition to the parts actually required to complete the four aeroplanes, spare parts are also shipped. Two main wing boxes are sent with each unit shipment of four planes. This box contains, besides the wings, with their fittings, axles, wing skids, landing gear, wiring plates, wheels, tires, struts, and fittings. One aileron box is also sent with each shipment of four planes.

"All boxes are lined with waterproof paper and the tops covered with tarred felt fastened down on the sides and ends. All the joints are sealed with cement, and the exteriors are given two coats of paint. Minute directions are given for packing the various parts of the aeroplanes. Braces and supports within the box are so constructed as to support the motor and fuselage. Metal parts which might corrode are protected by a neutral slushing compound which is resistant to the effects of sea air and salt water. The instruments on the instrument board are heavily covered with a coating of paraffine. The more delicate instruments are removed and packed carefully in special boxes, which in turn are sealed in airtight tin boxes.

"Shipments of spare parts for 100 De Haviland planes requires 105 cases, weighing approximately 164 tons. With every plane there are also shipped two Marlin synchronizing machine guns, operated by pilot, and two Lewis flexible machine guns, operated by gunner; camera, attachments for a radio set, sent separately; heating and lighting equipment, bombing equipment, and a great many instruments, such as air pressure gauge, oil pressure gauge, aneroid barometer, clock, compass, map case, fire extinguisher, pilot's safety belt, gunner's safety belt, and Very signaling pistol."

DEPARTMENT OF LABOR, U. S. EMPLOYMENT SERVICE

Managing Editor, Aerial Age,
New York City.

Dear Sir: We beg to direct your attention to the plans of the U. S. Employment Service, and to the great effect which this program will have upon the industrial life of the Nation.

On August 1, the supplying *of war industries* with common labor will be centralized in the U. S. Employment Service of the Department of Labor, and all independent recruiting of common labor by manufacturers having a payroll of more than 100 men will be diverted to the U. S. Employment Service. This is in accordance with the decision of the War Labor Policies Board and approved by the President on June 17. (The War Labor Policies Board is composed of representatives of the War, Navy, and Agricultural Departments, the Shipping Board and the Emergency Fleet Corporation, the War Industries Board, and the Food, Fuel, and Railroad Administrations. Its chairman is Felix Frankfurter, Assistant to the Secretary of Labor.)

The above action was found necessary to overcome a perilous shortage of unskilled labor in war industries. This shortage was aggravated by an almost universal practice of labor stealing and poaching.

While the restrictions against the private employment of

(*Continued on page* 1186)

The noted Allied aviators who are touring the Middle West with the Flying Circus. From left to right they are: Seated—Lieut. F. E. Welsh, Brigadier General Charles Lee, Major C. K. Rhinehardt, Captain J. A. Hannay, Lieut. H. E. Watson, Lieut. Earl Carroll. Standing—Lieut. M. B. Kelleher, Lieut. J. S. Reitenbaugh, Captain G. D. Hunter, Lieut. L. A. Clarke, Lieut. S. M. Connell

THE NEWS OF THE WEEK

Provisional Wing and British Flyers Arouse Great Interest in Aeronautics

THE Provisional Wing and British aviators have started on their aerial tour to arouse interest through the country.

Major C. K. Rhinehardt, the commanding officer of the Provisional Wing, and Lieutenant M. G. Cleary had a rough time flying to Dayton.

Dayton, Ohio.—Ten American aeroplanes left their hangars at the Wilbur Wright Aviation Field at 10 o'clock on Aug. 14 for the first leg of the 3,000-mile flight around the central western states as an educational campaign in the interests of progressive aviation.

The machines started for Cincinnati, where they were joined by three British machines under Brigadier-General Lee, R. A. F.

Major C. K. Rhinehardt of Hazelhurst Field, Mineola, L. I., led the American flying circus. He arrived here late on Aug. 13th after a 700-mile flight from Mineola.

Starting from Mineola in his famous Skull and Crossbone Curtiss "H" with Lieutenant M. G. Cleary at noon on August 12th, they made their first landing at the Aerial Mail Field at Philadelphia. From there they flew on to Dayton, Ohio, landing en route at Sunbury, Pa., Altoona, Hollidaysburg, about thirty miles from Pittsburg, and New Philadelphia, Ohio. They arrived at Dayton at 8 p.m. August 13th. The actual flying time was about seventeen hours.

Flying over the mountains, which they did at about seven thousand feet, they experienced considerable "humpiness" of the air.

The flying circus, which arrived at Cincinnati from Dayton on the evening of Aug. 14, for the first leg of the Western tour, comprised 6 Curtiss H machines, 2 Thomas Morse scouts, and three Avro planes. Included in the party, which was under the command of Major Rhinehardt, were Brig.-Gen. Charles Lee, Captain Hannay and Captain Hunter, of the British Aviation Mission.

The American fliers were Major Rhinehardt, Captain Fred H. Harvey and Lieutenants Earl Carroll, J. B. Boyd, Floyd E. Welsh, J. S. Reitenhaugh, Wesley Benner, H. E. Watson, M. B. Kelleher and S. M. Connell. All of the men are pilots and have completed their training both at training fields and at Mineola. The party purpose returning to Dayton, where they will give demonstrations of air fighting and maneuvers. The aviators of both parties will be entertained by the Greater Dayton Association.

The purpose of the tour of the aviators over the middlewest states is to show what has been done by the British and what will be done by the Americans, when they get over the lines in Germany. The Mineola field, where the aviators came from, was established for the purpose of giving the American fliers the training in this country that they would otherwise have been forced to get in France. Instead of the preliminary work over there, they are getting the same thing at the Long Island field, under instructors that have been through the battles with the Huns.

All Cincinnati paid tribute to the late Captain James Fitz Morris of the British Royal Air Force, who was so unfortunately killed in the flight across country with the Flying Circus, on August 14th. Crowds lined the streets while the cortege passed on its way to Memorial Hall, where funeral services were held. Many floral offerings were dropped from aeroplanes flying overhead, and these were placed on the gun-carriage on which the casket lay draped with the British and American flags. Captain Morris flew a Sopwith Camel equipped with 130 h.p. Clerget motor.

General Lee flies his favorite aero equipped with the 100 h.p. monosoupape Gnome motor and Captain Hannay flies a two-seater Bristol fighter equipped with a 275 h.p. Rolls-Royce. The American Curtiss planes are equipped with 150 h.p. Hispano-Suiza motors.

Jos. Pulitzer, Jr., In Aviation

St. Louis.—According to a despatch from Washington Joseph Pulitzer, Jr., of St. Louis, editor of the St. Louis *Post-Dispatch* has enrolled there in the Naval Aviation Corps, ground service, after being rejected in the flying service on account of poor sight.

Lieut. Harry V. Reynolds, engineer officer at Rockaway Naval Air Station, Long Island

The Aeroplane Expert in speaking of this machine said he thought it was the first German machine with five motors that had been brought down intact by the British.

"The engines," he said, "were of the Mercedes type, developing 220 Horse Power each, this making an aggregate Horse Power of 1100. This has not altogether come as a surprise to us, as we have been aware for some time of the existence of some of these five engine motors, in addition to many of the enemy giants which have four engines, developing high power for night-bombing. There is nothing very extraordinary in five engines it is merely a case of standardization."

Official Statement Regarding the De Haviland 4

An authoritative statement has been received from the Committee on Public Information by Aerial Age in regard to the much discussed De Haviland 4. This statement, which follows, should clear up in every respect the many rumors regarding this plane:

"The De Haviland 4 is a two-seater, general fighting machine developed in England and can be used with slight modifications for fighting, bombing, reconnaissance or photographic work. It has a speed of upwards of 125 miles an hour and is able to carry a considerable load of bombs. if necessary. The earliest shipments of the 4 had a number of defects which have since been remedied, some of the remedies being requested by General Pershing. Today these 4's are being shipped across in considerable numbers, shipments being requested regularly by cable from General Pershing. This machine is now being manufactured by three different factories. An American adaptation of the De Haviland 4, called the De Haviland 9, is also in the early stages of production."

Our Aviators Win 5 More Victories

With the American Army in France.—Capt. Charles J. Biddle of Andalusia, Pa., is the latest American aviator to down a German aeroplane. While out with a patrol on Aug. 15 Capt. Biddle met three monoplanes north of Flirey.

The Americans attacked and one of the German machines fell, apparently out of control. It vanished in the mist, so that Capt. Biddle's victory has not yet been confirmed.

Lieut. Vaughn R. McCormick of Columbus, O., got his second official German aeroplane on Aug. 14th, when he engaged the enemy in the air north of St. Mihiel.

French observers have confirmed the destruction of the German.

Another enemy machine was shot down Aug. 10 by Capt. Ray C. Bridgeman of Lake Forest, Ill., near Xivray, in the destruction of which Lieut. McCormick also shares officially.

Additional American victories in the air include a monoplane, apparently shot down by Lieut. Herman Schultz of Bettendorf, Ia., which went down in a steep dive through the clouds over Flirey after 375 shots had been fired at it, and a biplane attacked by Lieut. Edgar C. Tobin of San Antonio, in the vicinity of Evvezen. Confirmation is being sought for both these victories.

Aug. 14th was the most active day in the air for some time along the American battle front. One of the American planes attacked a German Rumpler machine and fired one hundred shots into it. The German disappeared, but apparently was under control. Another American machine forced a German to run for his life.

Defends De Haviland Plane

Washington.—The aircraft production investigation by the Senate Military Sub-Committee, which began about two months ago, was concluded on Aug. 15, with a statement from John D. Ryan, Chairman of the Aircraft Production Board.

Mr. Ryan expressed confidence that the De Haviland aeroplane, as it is being improved, will be a most satisfactory machine. He said he regarded as unjustified the many criticisms against it which have come competitors and others. This machine, he added, is now the principal one in quantity production and should not be abandoned.

New German Identification Mark

From a German source the Nieuwe Rotterdamsche Courant learns that a change has been made in the marking on German machines. The arms of the black cross are now straight—and not curved—with white edges. The change is said to have been made because the previous form made recognition of German machines very difficult, and because it easily led to confusion with the circular signs on hostile aeroplanes.

First Message Carried By Pigeon

Flying 27 miles in 21 minutes, the first Ellington field trained carrier pigeon made its initial flight carrying a message. The bird was released at Y. M. C. A. building No. 49 at Camp Logan and carried a note from D. S. Burke, the religious work director of that building, to Carl Barnett, building secretary of the upper field "Y" at Ellington.

The message was as follows:

"Congratulations for the new building."

The carrier was released by Corporal Knell of the pigeon detachment, who has had charge of its training. Mr. Burke was not at all confident that the bird would deliver the message, and was much surprised when he learned that it had reached its destination in such a short time.

The Latest Hun Bomber

Mention was made in General Haig's report of August 11th that a hostile night-bombing aeroplane had been brought down by fliers of the Royal Air Force. This machine was of the large bombing type and was equipped with five motors.

Transfer Made By Aeroplane

What is said to be the first instance on record of an officer transferring and reporting to his new station via air-route, was accomplished when Lieutenant Jay Howard Cather, formerly adjutant of the 499th Aero Squadron made a flight from Langley Field to Camp Lee, Va.

A feature of the trip was that the time was only 44 minutes from start to finish and was without mishap. With Captain Carolin as pilot, the officers left Langley Field at 11:30 a. m. and arrived at Camp Lee at 12:14 p. m. Quite a sensation was caused by the arrival of the party on wings. As one by-stander remarked, "What chance has Germany got when America is beginning to discard railroad trains in moving her troops. Next thing we'll hear will likely be that each man will be issued an aeroplane and the whole army will go to Berlin on wings."

U. S. Air Pilots Wear Unique Insignia On Battle Planes

Upon arrival at the headquarters of the First Pursuit Group, one is surprised to see how comfortable and cozy the pilots and mechanics are housed—and so close to the line that the roar of the guns is always heard. Intermittently, during the day and gradually increasing to such volume at night, one not used to it has difficulty in getting any sleep.

Each squadron has its own quarters, with separate kitchens and mess halls. The officers of each squadron have a private mess as well as headquarters. A representative of the *Plane News* was fortunate to dine with two of the squadrons and meet the fliers whose names are known throughout America.

The 94th Squadron has adopted an insignia that is painted on each side of every one of their planes. It is a large ring with Uncle Sams hat in it, and is typical of the squadrons record to date, they having officially accounted for the downfall of 18 Boche and hungry for more. An additional feature of the insignia is the small iron crosses dropping into the hat for each one of the Boche accounted for.

Another squadron of the same group, the 95th, has as their insignia a kicking mule. He is balanced on his fore feet, ears laid back, and doubled up in the act of letting go, preparatory to driving someone into Kingdom come. This squadron has used their "trade mark" in a unique manner in the decoration of their mess hall. Around the walls, near the ceiling, kicking mules are painted and on each mule the number of the pilot is shown and below an iron cross is painted for each Hun that particular pilot has shot down. If a pilot had brought down a Boche with the assistance of some other pilot, or in what they call a gang fight, a white horse shoe is painted around the cross. Number sixteen mule, that of Lieut. Casgraine, has a white border painted around it, which signifies he has been captured; another, number five, that of Lieut. Blodgett, has a black border, signifying his death.

A further feature of the mess halls are the trophies which are hung on the walls, consisting of parts of Hun machines brought down. Among them are facsimiles of the iron cross cut from the wings, revolvers, signals, control sticks, the rudder of the first machine brought down by Lieut. Campbell, machine gun, and the barrel of another bearing the following inscription "Barrel of Spandau Mitrailleuse which shot at Lieut. Campbell and was strafed therefore."

The First Pursuit Group today has accounted for 24 Hun planes, which means two entire squadrons have been wiped out. This is a remarkable record, considering that most of the pilots have been trained exclusively in American aviation schools and speaks well for the thoroughness of the training they undergo.

The success of the First American Chasse Group has given them a confidence and Esprit de Corps that will carry them through many a future fight. At present they have absolute control of the air in the sector they occupy. The few Huns seen refuse to fight, turning tail when the Americans come in sight.—*Plane News.*

Cleveland Sees Air Battle

Cleveland.—The "Flying Circus" of British and American military aviators thrilled hundreds of thousands of persons here with their exhibition of tricks in the air. Brig.-Gen. Charles Lee did various stunts, and Lieuts. Welsh and Connell in scout planes demonstrated an air battle for forty-five minutes at an altitude of about 3,000 feet. Six machines in battle formation made a cross-city flight.

Aero Mail Growing

Aug. 17th closed the first week of operation of the Aero Mail Service by the Post Office Department, with civilian aviators as pilots, and it proved a perfect week in the matter of trips. There was no interruption in spite of several storms, for the mishap to Aviator Maurice Newton's machine on Monday caused no delay. He landed at Hillside, a half mile east of Jamaica, instead of at Belmont Park, and Supt. H. L. Hartung of the Belmont Park Station reached the scene in a motor car in time to send the mail to New York on time.

Ensign R. R. Bottoms, U.S.N.R.F., the Hydrogen engineer at the Rockaway Navy Air Station

Earl Carroll—Caruso's Partner in Song Writing and Only American Composer—Now Full Fledged Lieutenant in U. S. Aviation Corps

Lieut. Earl Carroll, youthful American composer of popular musical comedies, such as "So Long Letty," "Canary Cottage," and others, now in Uncle Sam's Aviation Corps. Carroll enlisted at the beginning of America's entrance in the war, giving up an income of over $50,000 annually, and is now a member of the 1st Provisional Wing at Mineola.

Carroll is a Pittsburgh boy still in his early twenties. Just before enlisting he had completed a $40,000 bungalow on a New York skyscraper, where he and his bride had honeymooned. The photo shows Mrs. Carroll, a little French lady, who has four brothers at the front.

AMERICAN AVIATION REPORTS

American Fliers In Raid

Washington—American aviators have conducted successful raids on the railroad yards at Conflans, Longuyon, and Dommary Baroncourt, General Pershing reported in his communiqué for yesterday, which was made public tonight by the War Department. The text of the statement follows:

"Section A—Aside from the intermittent artillery activity there is nothing to report from sectors occupied by our troops.

"On Aug. 11 and 12 our aviators successfully bombed railroad yards at Longuyon, Dommary Baroncourt, and Conflans. All our machines returned."

Two Aeros Felled.

With the American Army in France, Sunday, Aug. 11. (By the Associated Press).—Two German aeroplanes have been brought down by American flyers in the last 24 hours on the Toul sector. Official confirmation, however, is still lacking. A third is believed to have been brought down.

The first German shot down was the victim of Capt. R. C. Bridgeman, of Illinois. The machine was seen to fall in flames near Xivray Saturday.

Saturday night a patrol of American flyers met four German biplanes near Tbiaucourt. Lieut. Tobin attacked one, and it went down into a nose dive.

The reported second victory occurred Sunday morning near Thiaucourt in an air battle between three German machines and several Americans.

Display of Trench-War Devices

Trench warfare devices of many types were demonstrated in Washington on July 11 before a gathering of War Department officials, Army officers and members of Congress as guests of the trench warfare section of the Ordnance Bureau.

The scene of the demonstration was the rifle range in a secluded valley of the hills that surround the capital. A feature of the display was the dropping of actual bombs from a De Haviland "4" day bomber, the machine equipped with the Liberty motor, now being produced in quantity for the use of American aviators in France. The rifle range lies down at the foot of a steep hill, on the top of which several hundred invited guests were gathered. Below them, from sand-bagged trenches, offensive and defensive hand grenades and rifle grenades were fired by salvos and in barrage. A row of figure targets, representing a charging line, was battered to pieces in a hail of grenades, showered over a ten-foot embankment. Switching to incendiary grenades, the firing party scattered fire over the grass in all directions and in another moment were showering a supposed advancing enemy with gas grenades. Moving out of the shelter, the squad started forward under a dense cloud of white smoke rising from the smoke bombs hurled ahead of them.

The hum of a motor, high overhead, announced the coming of the bombing machines. The first bombfi containing many pounds of high explosives, landed in the woods, bursting with a terrific concussion. A second tore a great hole in the center of the range, and a third dropped on a target butt, tearing out a thirty-foot crater. Other bombs contained inflammatory material and splashed the earth with flaming fragments.

American Aviator Beats Five Austrians

Italian Army Headquarters In Northern Italy—Lieut. Willis Fitch, an American aviator, is being congratulated by Italian air experts for his excellent handling of a bombing plane when five Austrian scout planes attacked him. Lieut. Fitch's machine was one of a bombing squadron intercepted before it reached its objective inside the enemy lines.

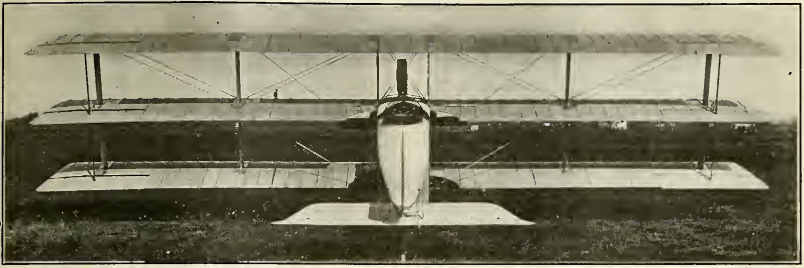
When Lieut. Fitch observed enemy planes arising to attack he dropped his bombs on two of their aviation camps and started back for the Italian lines. While still about thirteen miles inside enemy territory the five Austrian scout planes overtook him from the rear. He was without support, as others in his formation had preceded him toward the home hangar.

Lieut. Fitch dived to obtain maximum speed and then pursued a zig-zag course in the race for the Italian lines. Meanwhile his machine gunner maintained bursts of fire at the pursuers.

One enemy plane came down in a dashing attempt to destroy the bombing plane and passed within twenty-five feet. The enemy's fire was inaccurate, but that of the Lieutenant's machine gunner was true and the scout plane went into a swirling nose dive to the earth.

The four other Austrian airmen attacked in turn from varying distances, but the fire from the bombing plane each time frustrated their attempts. Finally, Lieut. Fitch's escort saw his predicament and returned, driving away the Austrian scouts.

(*Continued on page* 1193)



Rear view of the "baby" Caproni

GALLANTRY OF AMERICAN AIRMEN ABROAD

ONE of the dominant notes in the symphony of good news from abroad has been the gallantry of our air forces. On the French front, in General Foch's offensive, the effective work of our fliers has been related daily. Italy, too, has weighed American aviators and found them not wanting in helping to drive the Austrians back across the Piave.

Gianni Caproni, the Italian inventor whose monster bombing biplanes and triplanes are now being built in this country and equipped with Liberty engines, has given testimony about the American airmen on the Italian front in a letter just received by Lieutenant Leopold Belloni, who is Caproni's official representative in this country as well as the representative of the Italian air service. Parts of the letter, translated by Lieutenant Belloni, follow:

"The American aviators have performed truly marvelous things. During the past few days I have had occasion to speak often with Pilot Lemprini, who has been teaching the Americans the art of flying. He never becomes tired of endlessly praising them for their exceptional intelligence, their dash, their gallantry, and their love for the beautiful weapon. They are all very young; from 18 to 26 years of age. They have been welcomed by their Italian comrades with the greatest, the most heartfelt cordiality.

"At the training camp we prepared for them the best possible quarters, furnished with the latest comforts; much better, in fact, than what we do for our own officers. We also provided for them various games for outdoor and indoor amusement. To them has been given a complete technical instruction about the plane itself and about the motors. They have shown great intelligence and diligence, and were so fond of their machines that they took the greatest care of them, trying to learn every detail about construction and manoeuvres; even going so far as to clean their machines personally.

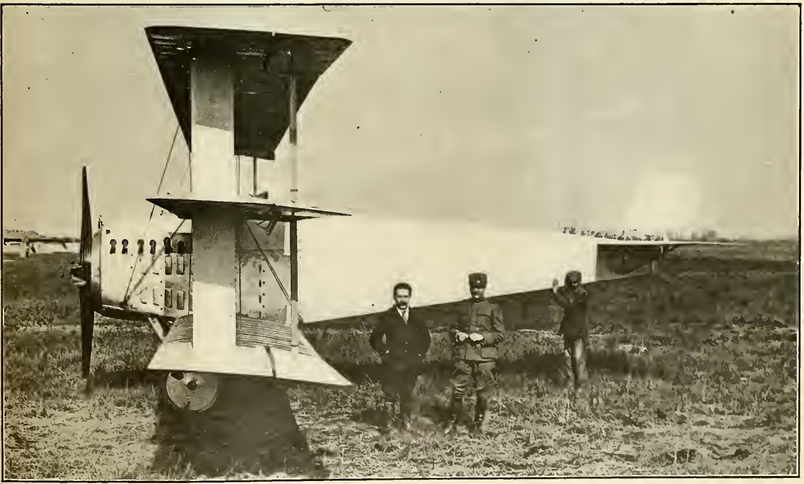
"Their instruction has been made easy by the fact that they all seem to be very clever sportsmen, technically very capable, so that they rapidly become perfect masters in flying. They made their first flights with an old Farman and became so efficient that very shortly they were promoted to be military pilots because of wonderful flights in which they set many records, showing remarkable piloting qualifications.

"Between pupils and teachers there has always been the greatest friendship. The instruction officers never had occasion to give an order; their mere advice was too promptly followed.

"When the Americans were permitted to fly the Capronis their enthusiasm knew no bounds. At first they looked somewhat perplexed at the size of the latest types, but when they saw that these giants were as docile, stable, and safe—more so, as a matter of fact—than the other machines, they were positively thrilled, and went at their training with still more enthusiasm than they had shown previously.

"And when they saw their teachers performing with the giant Capronis—not yet seen in America—those evolutions and 'stunts' which they were accustomed to think possible only for small machines, they said, with almost childish eagerness, and they wanted to start immediately to do the same things. And they actually did. They kept their word. They have been flying, both by day and by night, in exceptionally long cross-country raids. They loop over the wings, loop the loop, spin, and do antics that nobody could excel.

"These men have now been sent to the front, and they are covering themselves with the most genuine glory. They are proud and glad to fight for the greatness of their country, for the honor of the United States as well as for the freedom of the world, and are truly deserving of the greatest admiration. They have made an everlasting impression on me, and I am proud to have known them and to have been able to show them personally my admiration and thankfulness for what they are doing as well as for what they are. Among them I remember especially the Hon. La Guardia, MacGilwary, Manchester, Ciny, and many others whose names I cannot recall with she same ease with which I remember their clean-cut, joyful, intelligent features."



The remarkable "baby" Caproni triplane scout, the smallest member of the Caproni family, Mr. Caproni standing by. Official photo

The AIRCRAFT TRADE REVIEW

Improvement of "Liberty" Motor Rapid

"The Liberty motor is 50 per cent. better than it was six months ago. A like period hence will see even greater improvements in it.

This assertion is made by W. B. Stout, technical advisor, Aircraft Board, in a pamphlet on the problems of aeroplane improvements, issued by the Naval Consulting Board. The board issues an invitation to all persons to aid in the perfection of aircraft, and outlines certain features in which improvements are wanted. Suggestions will be welcomed on carburetion, ignition, engine parts, self-starters, exhaust mufflers, cooling radiators, the fuel system, propellers and machine gun synchronizers.

Noninflammable coverings for wings are sought, as well as stabilizing devices, bomb sighting devices and drift meters.

Our eventual success in the air, according to Mr. Stout, will depend on the ingenuity with which we can produce; first, quantity of aeroplanes, and second, quality. The Germans lead today, he says, in quantity production designs. With regard to the types of planes this is said:

"After the development of flying instruments reached a certain stage, night flying became popular. There is a demand for planes of exceedingly large type capable of carrying tons of bombs and flying at night. This requires them to be stable. These machines should have from two engines up, and should be fitted with illuminating apparatus. Electric lights are not suitable, but magnesium flares have been developed for this purpose. Night flying also involves new problems in protective measures relating to anti-aircraft guns, searchlights and combat tactics.

"Considerable speed can be added to all types of planes."

Here is the navy's invitation to the country to help in the perfection of aircraft:

"Many of the greatest improvements in industry have been made by men who had but little practical experience or technical training along the line in question. But they brought to the task the requisites most needed—a free brain, a clear insight and fresh enthusiasm. Perhaps yours is the mind that will see the way to some great improvement in aircraft, one of the most potent weapons for winning the war. A billion dollars has been set aside for production. We want the best in the world. Any help you can give will be welcomed. Inventions and ideas submitted in reply should be addressed to Thomas Robins, secretary Naval Consulting Board, 15 Park Row, New York."

Finley R. Porter has joined the government establishment at McCook Field, Dayton, O., as aeroplane engineer in charge of engine development. He was formerly chief engineer of the Mercer Motor Car Co., and afterward designer of the F. R. P. cars at Port Jefferson, L. I.

Steel for Aeroplane Wings

It is stated that the Superior Steel Co. in the United States is filling a large Government contract for what is said to be the thinnest sheet steel ever rolled, which is to be used to make wings for American fighting planes for use in France, replacing the present linen fabric wing. The Superior Co. is also making steel-frame rods to support the new wings. The steel for wings is one-thousandth of an inch thick. The new wings are said to be tear-proof, differing from the fabric wings, inasmuch as, though pierced by a bullet, they will not tear no matter what the speed of the plane.

Doehler Die Casting Plant Enlarged

Toledo.—The Doehler Die Casting Co. is expanding its plant to handle Government contracts on an enlarged scale. A 2-story building, leased from the Ohio Electric Car Co. will be used for making rifle and hand grenades, machine gun, gas mask and depth bomb parts, and aeroplane equipment. The Ohio Electric Car Co. has discontinued production, having been classified as a non-essential industry. It is expected that the Doehler company will soon take over a second Ohio Electric building.

U. S. to Make Pursuit Plane

Washington.—Production of a fast single-seater fighting aeroplane will soon be under way in this country; the machine selected is said to be the development of a modern British pursuit plane which has been very successful. Details of construction and performance of this machine have not been made public. Up to this time construction of single-seater fighting machines has not been undertaken in this country, as they have been turned out by the French and British factories for the American Army.

Overland Busy on War Work

Toledo.—The Willys-Overland Co. is now in full swing on the contracts it has accepted from the Government. The first contract was through the Toronto plant with the British Government, for 1,000 Sunbeam aeroplane engines. A quantity of these engines have been manufactured and accepted and actual deliveries are coming along rapidly.

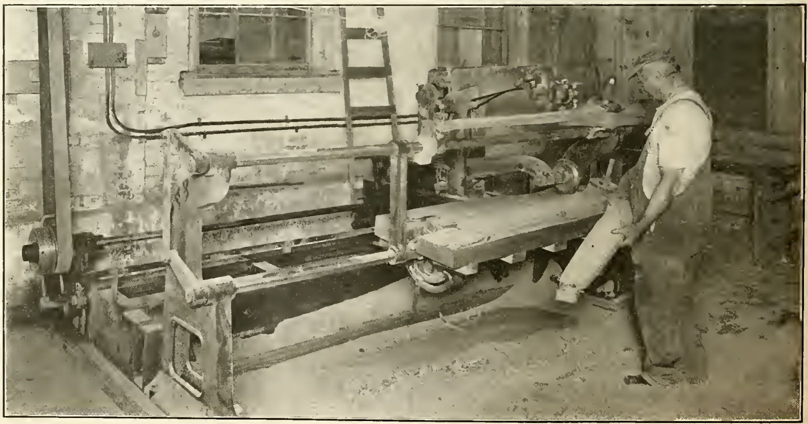
The second large contract was for 5,000 eight-cylinder training engines, for use in training planes at the several cantonments already established in this country. On this contract 835 engines were delivered in March and 1,003 in April. During May and June, according to contract, 1,000 will be delivered each month. Large orders have been received for parts for these training engines.

Guiding a Free Balloon

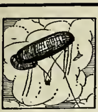
In the operation of "free" balloons there is no control over the direction taken by the balloon, as the craft must follow the wind direction. By ascending or descending into different air currents, however, an experienced balloonist is often able to maintain a desired direction. A noteworthy example of this took place last week at the balloon field of the Goodyear Tire & Rubber Company, near Akron, Ohio, when a pilot by skillfully following a series of air currents at different altitudes, after a flight of some twenty-five miles, brought his balloon back to the field, landing within one hundred feet of his starting point. In this school are being trained many young men who will soon be piloting aircraft on our battle fronts, and the proficiency they are acquiring augurs well for the carrying out of the American program of supplying "eyes" to its military forces.

Height at Which Sounds Can Be Heard

In one of his journals Camille Flammarion gives the heights at which sounds from the earth are heard from balloons. The shout of a man was heard distinctly at the height of 1,600 feet, the sharp note of a mole-cricket at 2,500 feet, and the croaking of frogs in a morass at 3,000 feet. At 3,255 feet a man's voice and the rolling of a cart were distinguished; at 4,550 feet the roll of a drum and the music of an orchestra; at 5,000 feet the crowing of a cock, the sound of a church bell, and sometimes the shouting of men and women. Nine hundred feet higher still was heard the report of a musket and the barking of a dog. The noise of a railway train penetrated to a height of 8,200 feet, and the whistle of a locomotive engine to nearly 10,000 feet.



A Fay-Eagan propeller cutting machine in operation at the Holbrook Company's plant



MILITARY AEROSTATICS

By LIEUT. H. K. BLACK, R. F. C., C. F. A.

THE accompanying illustration is a very comprehensive one. It will reward careful study on the part of a student of aeronautics by disclosing a great many points in regard to Observation Balloon procedure in France at the present time. The photo was taken in France, that fact the writer can vouch for, for on numerous occasions he has passed this very position.

In the first place, the balloon is a Cacquot type, Model M, and operated by the British Royal Flying Corps. The Balloon is seen here from the stern. It is "on the Winch," that is, in position, ready to ascend. The balloon has been fastened to the cable and the cable to the gasoline operated winch. This winch is built on a Motor truck which can move up and down a road under its own power. Here is seen the winch road. The balloon ascends from this position and when it is at a height the winch drives along the road, closer to the trenches.

The fins of the balloon can be seen to advantage in the illustration. The rudder can also be seen underneath the balloon.

The rudder and the fins are filled with air and perform numerous functions. They keep the balloon head on to the wind; they keep the balloon flying level, and with the aid of the internal ballonet they equalize the pressure of the gas, thus preserving the shape of the envelope.

On the upper surface of the envelope can be seen the mooring guys. These are small ropes which are fastened to the little dark spots on the upper surface. These little dark spots are in reality, rings, sewn to the envelope.

The crew are holding the balloon down to earth by the handling guys, while the telephone is tested and the instruments adjusted by the observers before ascent. The basket, with the two observers in it may be seen below the bag. The white spot to the right of the basket is the attached map-board, which carries the squared map with the enemy positions marked on it.

While a balloon is in the air it is very difficult for the enemy to locate it with their artillery. One would casually think that observation while firing at a balloon would be the most easy thing in the world. Exactly the contrary is the case.

The trouble is caused by the fact that there is nothing to judge the bursts of the shells by. From the position where they were fired nothing can be judged except whether the shells are going straight for the balloon or not. Nothing is known as to whether the shells burst in front of or behind the balloon. Observation from the flank will tell this but flank observation will not tell the truth about the correctness of the line. Cross observation is the only way to shoot up a balloon successfully.

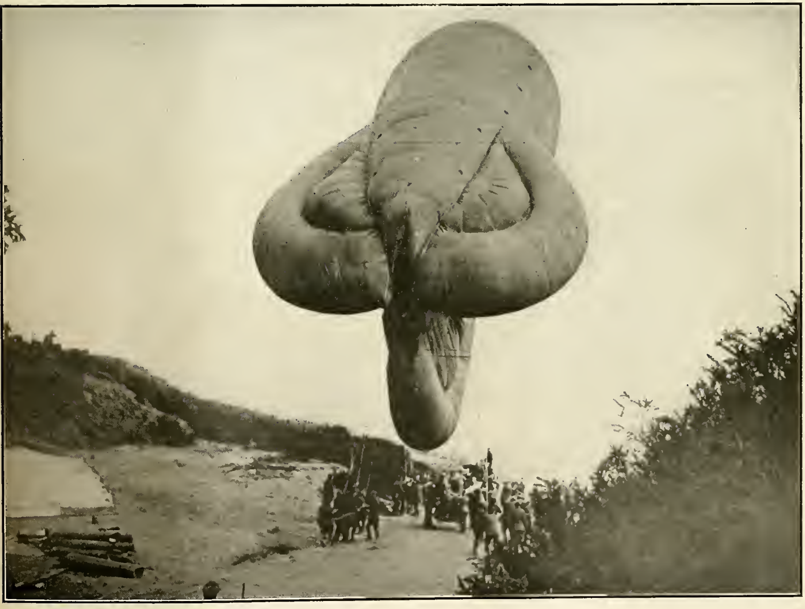
However, while a balloon is on the ground before it gets into the air, if it is seen by the enemy, it is an easy target. Therefore, no time is wasted when a balloon is getting into the air. Everything is carried out with the greatest dispatch. It is good practice to have a sheltered place for the balloon to ascend, sheltered both from the weather and from the enemy. The reader will note in the photograph, how the balloon is concealed by the surrounding hills.

This winch position is very close to the balloon bed. The latter can be seen on the extreme left. The white sheet arrangement is a canvas ground cloth laid and pegged down to the ground, which has been properly prepared for its reception. This tarpaulin not only helps to keep the balloon dry, but it prevents stones, branches, roots and such like from rubbing or puncturing the balloon.

The balloon is tied down to the bed and weighted with sandbags. In the foreground, in front of the bed, can be seen the compressed hydrogen tubes from which the balloon is filled with gas.

The Balloon bed is here shown built on slightly sloping ground, as it should be, the better to provide for drainage.

(To be continued)



The Holbrook Company Factory

Hand surfacing and finishing propellers after all machine operations have been made. Templets are constantly applied to insure accuracy of pitch

Final inspection for balance — ready for shipment

Grinding blade ends to accommodate brass or copper protective tips

On the right applying first coat of varnish

Interior views of the Holbrook Company propeller department

CHARACTERISTICS OF THE AERIAL PROPELLER

By S. E. SLOCUM, Ph.D.

Professor of Applied Mechanics, University of Cincinnati, Member S. A. E.

PREVIOUS to the advent of the aeroplane, years of experiment with the marine propeller had proved that it was difficult to determine theoretically the elements of propeller action. In marine practice the chief reliance was on experiment and, in the course of time, sufficient experimental data was accumulated to serve as a basis for design. When it became necessary to design an aerial propeller, however, it was found that the action of a propeller in air was very different from that in water, and it was therefore necessary to begin experimenting all over again.

Typical experiments on the aerial propeller have been carried out by M. Eiffel in his laboratory at Auteuil, the results of which appear in his work on "Resistance of the Air and Aviation." Eiffel, however, made no use of these results other than to present them graphically by plotting. The object of this paper is to study these results more carefully and to derive from them by the method of Least Squares a formula which shall represent the characteristics of the aerial propeller.

For the purpose of Eiffel's experiments two propellers were constructed by M. Drzewiecki, one, full size, 2.715 m. in diameter, and the other its one-third size model, 0.905 m. in diameter. The full size propeller was tested by Captain Dorand at Chalais, and the model by M. Eiffel in his laboratory at Auteuil. The propeller of M. Drzewiecki was a screw with a constant angle of incidence of 5 degrees, and a width of blade equal to one-sixth the radius.

In order to present the results of these experiments graphically, it is necessary to use as abscissa and ordinate certain combinations of the quantities involved. To indicate these quantities, let

V = velocity of translation of propeller relative to the air in meters per second,

n = speed of propeller in revolutions per second,

D = diameter of propeller in meters,

F = thrust of propeller in kilograms.

If the velocity of translation and the velocity of rotation at the tip of the blade are varied proportionally, the relative velocity of any point varies with them but remains unchanged in direction; that is to say, for a given direction of the relative velocity at the tip, the relative velocity at any point is fixed in direction and varies directly as V. For this reason Eiffel chose the ratio $\frac{V}{\pi nD}$ or $\frac{V}{nD}$ as abscissa in drawing the graph representing his experiments. For ordinate, however, Eiffel chose the combination $\frac{F}{N^2D^4}$; that is to say, he *assumed* that the thrust varied as the square of the speed and fourth power of the diameter. When his experimental data were plotted, however, this assumption was found to be incorrect, as it produced a series of parallel curves. From this result Eiffel concluded that "the reaction of the air upon a propeller cannot be assumed exactly proportional to the square of the relative velocity," but made no attempts to modify his assumptions to fit his experiments.

In what follows the combination $\frac{V}{nD}$ used by Eiffel as abscissa is retained, as the choice of the independent variable is not essential and this choice makes it possible to compare results with those obtained by Eiffel. Eiffel's assumption for the ordinate is not followed, however, but the proper combination is determined from Eiffel's experimental data by the method of Least Squares. The final result of this method will be found to fit the entire series of exceptional data determined both by Eiffel and Dorand with a surprising degree of accuracy.

The experimental data observed by Eiffel and Dorand are given in the left side of the following table. On the right side are tabulated certain quantities computed from these data, as explained in what follows.

EIFFEL'S EXPERIMENTS.

Revolutions		Velocity V	Thrust F	$\frac{V}{ND}$	$\frac{F}{N^{2.261}D^{4.254}}$
Per Min.	Per Sec.	meters,/sec.	Kilograms		
600	10	0	1.060	0	.0088863
942	15.7	0	2.660	0	.0080421
1260	21	0	5.290	0	.0082858
1600	26 2-3	0	9.850	0	.00898995
600	10	5.22	0.668	0.577	.0056000
942	15.7	5.44	2.390	0.384	.0072258
1260	21	5.66	4.870	0.298	.0076279
1600	26 2-3	6.30	8.550	0.262	.0078031
600	10	8.00	0.071	0.885	.00059521
942	15.7	8.10	1.695	0.571	.0051245
1260	21	8.39	4.090	0.443	.0064062
1600	26 2-3	8.72	7.650	0.362	.0069817
942	15.7	10.20	1.087	0.719	.0032864
1260	21	10.35	3.400	0.546	.0053255
1600	26 2-3	10.65	6.880	0.442	.0062790
942	15.7	12.57	0.268	0.886	.00081025
1260	21	12.68	2.530	0.668	.0039628
1600	26 2-3	13.00	5.800	0.539	.0052933
1260	21	15.07	1.510	0.794	.0023651
1600	26 2-3	15.35	4.940	0.637	.0045084
1260	21	17.32	0.376	0.913	.00058893
1600	26 2-3	17.53	3.510	0.727	.0032034
DORAND'S EXPERIMENTS.					
540	9	0	90.5	.0	.0089918
540	9	4.9	84.4	.2	.0083857
540	9	9.8	70.7	.4	.0070246
540	9	14.6	49.6	.6	.0049281

Since Eiffel's assumption that the thrust varies as the square of the speed proved to be incorrect, the first step is to determine the relation between thrust and speed. For this purpose make use of Eiffel's first set of four experiments, in which V is zero, and write the required relation in the form

$$F = Cn^aD^b \tag{1}$$

This is equivalent to determining the ordinate to the curve shown in Figure 1 corresponding to the abscissa $\frac{V}{nD} = 0$.

Since Eiffel's experiments were all performed on the same propeller, D is constant, and we may therefore combine C and D in a single constant K, in which case we have

$$F = Kn^a, \tag{2}$$

in which a is the unknown quantity to be determined. Reducing this equation to the linear form by taking logarithms, it becomes

$$\log F = \log K + a \log n. \tag{3}$$

Substituting in this the values of F and n from the first four of Eiffel's experiments, we obtain the following set of four observation equations:

$$\left\{\begin{aligned} .025306 &= \log K + a \\ .424882 &= \log K + 1.195900a \\ .723456 &= \log K + 1.322219a \\ .993436 &= \log K + 1.425969a \end{aligned}\right. \tag{4}$$

We have here four equations in two unknowns, namely log K and a. To obtain the most probable value of the unknowns from such a set of conditioned observation equations by the method of Least Squares, the process consists in reducing the set to as many normal equations as there are unknowns, which in this case is two. The normal equation for a is obtained by multiplying each observation equation by the coefficient of a in this equation and adding the results. Similarly the normal equation for log K is obtained by multiplying each observation equation by the coefficient of log K in this equation and adding the results. The resulting normal equations are as follows:

$$(5)\quad \begin{cases} \text{Normal equation for } \log K \\ \quad 2.167080 = 4 \log K + 4.944088a, \\ \text{Normal equation for } a \\ \quad 2.906599 = 4.944088 \log K + 6.211837. \end{cases}$$

Solving these two equations simultaneously for the two unknows, the result is

$$(6)\quad \begin{cases} a = 2.261, \\ \log K = -2.252876 = 7.747124 - 10, \\ \text{whence } K = .0055863. \end{cases}$$

The next step is to determine how the diameter of the propeller affects the thrust. The only experimental data available for this is to compare corresponding experiments made by Eiffel and Dorand. Since the model tested by Eiffel was built to one third the size of the propeller tested by Dorand, to develop similar characteristics the speed of the model should be three times that of the full size propeller. The following data from the two sets of experiments are therefore chosen for comparison:

EIFFEL	DORAND
$D = 0.905$ m.	$D = 2.715$ m
$F = 9.85$ kg.	$F = 90.5$ kg
$n = 1600$ r.p.m. $= 26\frac{2}{3}$ r.p.s.	$n = 540$ r.p.m. $= 9$ r.p.s.

Writing formula (1) in the form

$$(7)\quad \frac{F}{n^{2.261}} = CD^b$$

and substituting the above data, we obtain the two equations

$$(8)\quad \begin{cases} \dfrac{9.85}{(26\frac{2}{3})^{2.261}} = C\ (.905)^b \\ \dfrac{90.5}{9^{2.261}} = C\ (2.715)^b \end{cases}$$

Eliminating C and solving for b the result is

$$(9)\quad b = 4.254$$

To find the constant C we have from equations (1) and (2),

$$(10)\quad CD^b = K,$$

or, by taking logarithms,

$$\log C + b \log D = \log K,$$

in which $D = 0.905$ and, as already found, $b = 4.254$ and $\log K = 7.747124 - 10$.

Consequently

$$\log C = 7.931539 - 10$$

whence

$$(11)\quad C = .008542$$

For V = O, the required relation is therefore

$$(12)\quad F = .008542\, n^{2.261}\, D^{4.254}$$

A large two-blader for a dirigible

We may now proceed to determine the general expression for the thrust in terms of the relative velocity of the air with respect to the propeller. This is equivalent to finding the equation of a curve which best fits the observed data. The curve most suitable for this purpose is one represented by an algebraic equation of the form

$$y = C + P x + Q x^2 + R x^3 + \ .\ .\ .\ .$$

as many terms being taken as may prove to be necessary. In the present case, by plotting the observed data, it is found that the points so determined assume the form of a parabola. This suggests that the first three terms of the above expression will be sufficient, namely

$$y = C + P x + Q x^2.$$

As mentioned above, the quantity $\frac{V}{nD}$ represents the abscissa x, and the combination just determined, namely $\frac{F}{n^{2.261} D^{4.254}}$ the ordinate y. The equation of the required curve therefore takes the form

$$(13)\quad \frac{F}{n^{2.261} D^{4.254}} = C + P\left(\frac{V}{nD}\right) + Q\left(\frac{V}{nD}\right)^2$$

in which the coefficients C, P and Q are to be determined. The first coefficient C has already been determined, since for V = O we have found that

$$C = 0.008542$$

To determine P and Q substitute the experimental data observed by Eiffel and Dorand in Equation 13. The values of $\frac{V}{nD}$ and $\frac{F}{n^{2.261} D^{4.254}}$ have been calculated from these data and appear in the right hand side of Table 1. Substituting these calculated values we thus obtain the following set of twenty-one observation equations in the two unknowns P and Q:

OBSERVATION EQUATIONS

Observation equations based on Equation 13 written in the form

$$0 = \left(C - \frac{F}{n^{2.261} D^{4.254}}\right) + P\left(\frac{V}{nD}\right) + Q\left(\frac{V}{nD}\right)^2.$$

EIFFEL'S DATA

$$\begin{aligned} 0 &= .002942 + P\,(.577) + Q\,(.577)^2 \\ 0 &= .001316 + P\,(.384) + Q\,(.384)^2 \\ 0 &= .000914 + P\,(.298) + Q\,(.298)^2 \\ 0 &= .000739 + P\,(.262) + Q\,(.262)^2 \end{aligned}$$

$$\begin{aligned} 0 &= .007947 + P\,(.885) + Q\,(.885)^2 \\ 0 &= .003417 + P\,(.571) + Q\,(.571)^2 \\ 0 &= .002136 + P\,(.443) + Q\,(.443)^2 \\ 0 &= .001560 + P\,(.362) + Q\,(.362)^2 \end{aligned}$$

$$\begin{aligned} 0 &= .005256 + P\,(.719) + Q\,(.719)^2 \\ 0 &= .003216 + P\,(.546) + Q\,(.546)^2 \\ 0 &= .002263 + P\,(.442) + Q\,(.442)^2 \end{aligned}$$

$$\begin{aligned} 0 &= .007732 + P\,(.886) + Q\,(.886)^2 \\ 0 &= .004579 + P\,(.668) + Q\,(.668)^2 \\ 0 &= .003249 + P\,(.539) + Q\,(.539)^2 \end{aligned}$$

$$\begin{aligned} 0 &= .006177 + P\,(.794) + Q\,(.794)^2 \\ 0 &= .004034 + P\,(.637) + Q\,(.637)^2 \end{aligned}$$

$$\begin{aligned} 0 &= .007953 + P\,(.913) + Q\,(.913)^2 \\ 0 &= .005339 + P\,(.727) + Q\,(.727)^2 \end{aligned}$$

DORAND'S DATA

$$\begin{aligned} 0 &= .000156 + P\,(.2) + Q\,(.2)^2 \\ 0 &= .001517 + P\,(.4) + Q\,(.4)^2 \\ 0 &= .003614 + P\,(.6) + Q\,(.6)^2 \end{aligned}$$

To obtain the most probable values of P and Q from these equations, by the method of Least Squares, follow the same process used above for reducing them to a pair of normal equations. To obtain the normal equation for P multiply each equation through by the coefficient of P in this equation and add the results. Similarly, to obtain the normal equation for Q multiply each equation through by the coefficient of Q in this equation and add the results. The two normal equations derived in this way are then as follows:—

$$(14)\quad \begin{cases} 0 = .0526032 + 7.564893\,P + 5.2702055\,Q, \\ 0 = .038974455 + 5.2702055\,P + 3.9077221\,Q. \end{cases}$$

Solving these simultaneously for P and Q the results are

$$(15)\quad \begin{cases} P = -.00009015 \\ Q = -.00985184 \end{cases}$$

Here is shown tbe wood for the propellers being steamed. All wood used in their manufacture is placed in the boxes shown above and steamed in tbis apparatus. Tbis is done to avoid warping

The required formula, representing a parabola adjusted as above to fit the observed data, is then as follows:—

$$\frac{F}{n^{2.261} D^{4.254}} = .008542 - .00009015\left(\frac{V}{nD}\right) - .00985184\left(\frac{V}{nD}\right)^2. \tag{16}$$

Plotting this equation, we have the curve shown in Figure 1. Plotting on the same sheet the observed data of Eiffel and Dorand, it is apparent that this parabola fits the data with exceptional closeness. In place of Eiffel's series of curves drawn separately for each value of nD, we have thus obtained a single relation which holds for all values of n and D.

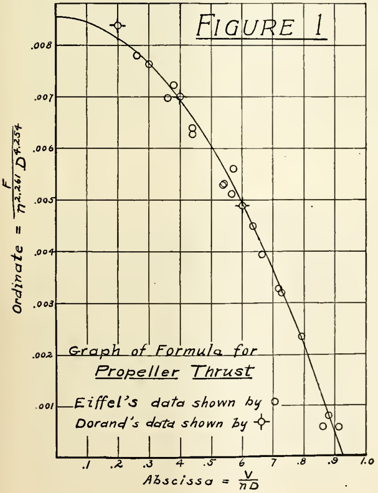


FIGURE 1

Since the coefficient P of the middle term is so small in comparison with the other two cofficients C and Q, it naturally suggests that this linear term may be omitted from the equation of the parabola without materially affecting the shape of the curve. To try the effect of omitting the middle term, return to the set of 21 observation equations and omit the term containing P in each. Then forming the normal equation for Q from this set in the usual way, the result is

$$0 = .038974455 + 3.9077221\ Q$$

whence

$$Q = -\ .0099734$$

or with sufficient exactness

$$Q = -\ .01.$$

The simplified equation of the curve therefore becomes

$$\frac{F}{n^{2.261} D^{4.254}} = .008542 - .01\left(\frac{V}{nD}\right)^2. \tag{17}$$

Plotting this parabola on the same sheet with that given by equation (16) as represented in Figure 1, it is found that the two curves are practically coincident, the ordinates for $\frac{V}{nD} = .7$ being identical, and the maximum difference in ordinates being less than two-tenths of one per cent.

Converting this formula from metric into English units by expressing

V in feet per second,
D in feet,
F in pounds,
n in revolutions per second,

the resulting equation in English units is

$$\frac{F}{n^{2.261} D^{4.254}} = .00012 - .00014\left(\frac{V}{nD}\right)^2. \tag{18}$$

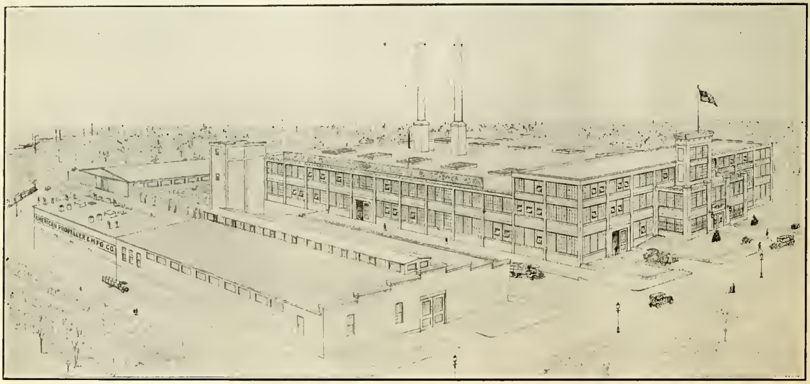
Finally, this formula may be simplified somewhat for practical calculations by writing it in the form

$$F = \frac{n^{2.261} D^{4.254}}{50{,}000}\left[6-7\left(\frac{V}{nD}\right)^2\right] \tag{19}$$

In a subsequent article the writer will present the corresponding formulas for propeller torque and for brake-horsepower.

THE AMERICAN PROPELLER & MANUFACTURING CO.'S NEW PLANT

The original factory of the American Propeller & Manufacturing Company


AMERICAN PROPELLER & MFG. CO.

The new factory of the American Propeller & Manufacturing Company

THE American Propeller & Manufacturing Company of Baltimore has just completed the erection of a new factory which will enable this pioneer firm to maintain its position as the largest maker of airscrews in America.

The new plant, designated as plant Number Four, is a modern three-story structure occupying two acres of ground and contains 95,000 square feet of floor space. It has a capacity of 300 combat or 500 training plane propellers daily. Plants numbers 1, 2 and 3 can produce 90 combat propellers or 150 training propellers daily. The plan is to devote these original plants to the production of training propellers and experimental work, concentrating on the production of combat and large lane propellers at the new plant. The new building is especially designed for propeller manufacture in quantities and is planned to execute the work to the greatest advantage.

The basement contains the power and electric plant and the dry kilns. Here all the lay-out work, rough moulding, joining, assembling, gluing, and drying is done. All machine operations are executed on the first floor.

The second floor is devoted to the surfacing and metal tipping department, while the third floor is devoted to the varnishing and final inspection.

An outstanding feature of the new plant is the ingenious machinery which was designed by Mr. Spencer Heath, the president of the company, particularly the duplicating machine, which does the work of three ordinary lathes, and the special instrument which accurately determines the pitch of the propellers without the use of templets.

With the addition of this new factory, the American Propeller Company has four plants in Baltimore with a total floor space of 158,000 feet and dry kiln capacity of 350,000 feet B. M., and employs 1,200 people. This, unquestionably, makes this firm the largest exclusive manufacturer of propellers in America and its remarkable growth parallels the expansion of the aeronautic industry in America.

The firm was established in 1909 in Washington by Mr. Spencer Heath, and in 1912 moved to Baltimore. At this time Mr. J. M. Creamer joined Mr. Heath as the Vice-President and General Manager of the institution.

Up until the beginning of the war this firm was purely an engineering proposition and the manufacture was limtied to custom made work to suit the individual requirements of each plane. This firm has probably made more propellers for experimental work than any other manufacturer of propellers.

Primarily, its mission is to solve the engineering problems of aircraft propulsion, and the practical knowledge of this important part of the aeroplane has enabled this firm to prove of valuable assistance to the Allies as well as to America.

The machine shop of the American Propeller & Manufacturing Company

NOTES ON AIRSCREW ANALYSIS

By M. A. S. RIACH, A. F. Ae. S., Assoc. Inst. N. A.

THE present investigation is the outcome of an attempt to modify the existing theory of the airscrew so as to more correctly represent the conditions under which an airscrew may be supposed to be working, and to thereby more closely co-ordinate theory with experiment. The most complete working theory of the subject yet evolved is probably the one outlined in the writer's paper "The Screw Propeller in Air,"* and further developed with modifications in "The Screw Propeller with Race Rotation," published in AERONAUTICS of last year.† Both these papers depend for their basis upon wind-channel tests on aerofoil sections. In the theory so far developed, certain assumptions have had to be made, and the particular nature of those finally adopted leads to certain results which can be compared with experimental tests. Conversely, if the experimental results are found to differ materially from those given by the theory, then obviously it would become necessary, if possible, to modify the basic conceptions underlying the analytical treatment of the subject. Such experimental tests must of necessity, however, be very accurately carried out, and also of a sufficient number to exclude as far as possible the possibility of serious errors in the work. Before, however, attempting to make any comparisons between experiment and theory, it is convenient to analyse the changes likely to be brought about by variation in one or more of the parameters involved in the hypothesis upon which the theory is based.

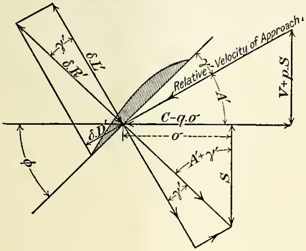


FIG. 1

Three main assumptions have been made in the treatment as it has so far been developed:

(1) The flow of air over the blade is everywhere assumed to be two-dimensional.

(2) The ratio of the inflow velocity (axial and transverse) immediately in front of any blade element to the slip velocity (axial and transverse) at the same radius has been taken to be equal to one half. This is rigorously true if it be assumed that the energy in the wake is numerically equal to the work done in acquiring the total slip velocities both axial and transverse.

(3) The whole of the ring annulus at all radii is assumed to be operative in producing thrust, or, more correctly, in measuring the mass of fluid passing per second. Thus the coefficient has a value of unity.

In the present investigation, (1) will be assumed to be true, but (2) and (3) will be made to vary

We commence by variation of (2) *only.*

With the previous notation let $(V+p.S)$ be the relative air speed axially at the blade element, and $(C-q.\sigma)$ the transverse relative air speed, where p and q are substituted for $\frac{1}{2}$ as given previously.

Then we have at once:

$$\text{Tan } A'=\frac{V+p.S}{C-q.\sigma}, \text{ and } \frac{V}{C}=\tan A$$

giving

$$\sigma=\frac{C.[\tan A'-\tan A]-p.S}{q.\tan A'} \quad . \quad . \quad (1)$$

Again consider Fig. 1.

Let A' be the angle of the relative wind, having components $(V+p.S)$ axially and $(C-q.\sigma)$ transversely, then the resultant force $\delta R'$ on the blade element must lie at an angle of $(90^\circ+\gamma')$ to the relative wind, γ' being the gliding angle of the blade section. Hence the corresponding direction of the *total* slip velocity (axial and transverse) must be inclined at an angle of $90^\circ-(A'+\gamma')$ to the plane of rotation, having components of velocity denoted by S and σ respectively. It is then evident from the figure that

$$\frac{\sigma}{S}=\tan(A'+\gamma') \text{ which is independent of } p \text{ and } q.$$

Hence

$$\sigma=S.\tan(A'+\gamma') \quad . \quad . \quad . \quad . \quad (2)$$

eliminating σ from (1), we get:

$$\frac{C.[\tan A'-\tan A]-p.S}{q.\tan A'}=S.\tan(A'+\gamma')$$

i.e.,

$$S=\frac{C.(\tan A'-\tan A)}{p+q.\tan A'.\tan(A'+\gamma')} \quad . \quad . \quad (3)$$

giving the value of the total axial slip S in terms of p and q. If $p=q=\cdot 5$, S reduces to the original formula given in "The Screw Propeller with Race Rotation."

Now the axial thrust on any blade element is given by:

$$dT'=\frac{cy'.\rho.b.dx.(V+p.S)^2.\cos A'.(1-\tan A'.\tan\gamma')}{\sin^2 A'} \quad (4)$$

under the new hypothesis,

and the mass of air passing through any annular ring element along the propeller blade may be written:

$$dM'=f.\rho.2\pi x.dx.(V+p.S) \quad . \quad . \quad . \quad (5)$$

where f is a coefficient having a maximum possible value of unity.

Hence thrust per annulus $=dM'.S$

and ∴ ,, blade $=\frac{dM'.S}{N}$, with N blades.

whence equating this to (4), we get:

$$cy'=\frac{f.2\pi x.S.\sin^2 A'}{N.b.(V+p.S).\cos A'.(1-\tan A'.\tan\gamma')}$$

or, substituting for S from (3), we obtain:

$$cy'=\frac{f.2\pi x.\sin A'.(\tan A'-\tan A)}{N.b.(1-\tan A'.\tan\gamma').[p+q.\tan A.\tan(A'+\gamma')]} \quad (6)$$

Now it is at once evident that a variation of either p or q between the possible limits zero and unity will only produce comparatively small changes in the function cy', excluding, of course, such values of either p or q which make cy' infinite.

Turning, then, to the second possible variant—namely (3), we may consider the changes in the value of cy' brought about by variation of f, the coefficient of the annular ring element at radius x. It is probably sufficiently accurate for this purpose to assume that f retains its value for all radii.

An investigation on these lines, combined with experimental results, reveals the fact that f cannot remain constant for all values of V, and must be, in fact, a function both of V and S—*i.e.*, of A', and this naturally leads us to a new hypothesis.

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* Read before the Aeronautical Society, March 1917

† *The Screw Propeller with Race Rotation*, AERONAUTICS, September 19, 1917

A New Hypothesis

It would appear that however we may regard the problem, the only real unknown is the exact quantity of fluid that may be supposed to pass through the annualar ring element per second. We started by assuming that either the whole of the ring element was employed to produce thrust, or that the amount could be represented by some constant fraction (f). There is, however, another method of estimating, and it is this new process that will now be described. Consider an element of blade at a radius of x and at an angle of φ to the plane of rotation, Fig. 2.

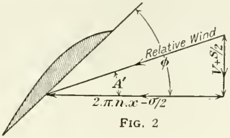


FIG. 2

Then the relative wind speed striking the element of blade has a value of $(V+S/2).\text{cosec}\,A'$, and an inclination of A' to the plane of rotation. It is further fairly obvious that the air affected by the presence of the blade element extends to a great distance above and below the section in a direction normal to the direction of the relative wind. As, however, the amount of such variation is unknown, *a priori* it is at least legitimate to substitute for such an extended field a finite layer which may then be considered as possessing a uniform deflection and velocity which is the equivalent of the more correct strata of influence. This distance we will call the "gap" of the section, and its value may be denoted by the symbol Ω. Having now defined the new premises, it is an easy matter to estimate the amount of fluid passing the section per second. The mass of fluid affected per second by the blade element will be therefore:

$$\rho.\Omega.dx.(V+S/2).\text{cosec}\,A'$$

for *each* blade, and hence the total for the airscrew having N blades:

$$\rho.N.\Omega.dx.(V+S/2).\text{cosec}\,A' \text{ instead of}$$
$$\rho.f.2\,\pi x.dx.(V+S/2),$$

so that now (f) must have the value of:

$$f=\frac{N.\Omega.\text{cosec}\,A'}{2.\pi.x},$$

i.e., f is now a function of A', and hence of V and S.

Now the distance between any two consecutive blade paths may be easily shown to be equal to:

$$\frac{\sin A'.(2\pi nx-\sigma/2)}{N.n}=\frac{\sin A'.}{N}\left[2.\pi.x-\frac{\sigma}{2.n}\right]$$

and hence Ω should not exceed this value, although there is probably a very sensible interference between the blades for a much smaller value than this, possibly, indeed, for *all* values, and increasing with increase of the ratio:

$$\frac{\Omega.N}{\sin A'.\left[2\pi x-\dfrac{\sigma}{2.n}\right]}$$

So far the hypothesis has been kept comparatively general, but it will be necessary to introduce a further modification connecting Ω with the blade width (b). For the present we shall regard the ratio $\left(\frac{\Omega}{b}\right)$ as a constant for all radii, as well as for all values of A', and possibly also for all types of airscrews.

The ratio $\left(\frac{\Omega}{b}\right)$ will be denoted by (μ), and the value of (μ) appears to be about 1 to 1·3—*i.e.*, the "equivalent stratum" of air affected by any blade element is approximately equal in *depth* to the blade width at that radius.

We now proceed to estimate the value of cy' as before:

axial thrust per annulus per blade

$$=\rho.\Omega.dx.(V+S/2).\text{cosec}\,A'.S$$

axial thrust per element per blade

$$=\frac{cy'.\rho.b.dx.(V+S/2)^2.\cos A'.(1-\tan A'.\tan\gamma')}{\sin^2 A'}$$

Hence equating these two expressions, we obtain:

$$cy'=\frac{\Omega.\tan A'.S}{b.(V+S/2).(1-\tan A'.\tan\gamma')}.$$

But

$$S/2=\frac{2.\pi.n.x.(\tan A'-\tan A)}{1+\tan A'.\tan(A'+\gamma')}$$

and $\therefore$

$$V+S/2=2.\pi.n.x.\left[\tan A+\frac{\tan A'-\tan A}{1+\tan A'.\tan(A'+\gamma')}\right]$$
$$=2.\pi.n.x.\left[\frac{\tan A'.\{1+\tan A.\tan(A'+\gamma')\}}{1+\tan A'.\tan(A'+\gamma')}\right]$$

and $\therefore$

$$\frac{S}{V+S/2}=\frac{2.(\tan A'-\tan A)}{\tan A'.[1+\tan A.\tan(A'+\gamma')]}$$

and $\therefore$

$$cy'=\frac{2.\Omega.(\tan A'-\tan A)}{b.[1-\tan A'.\tan\gamma'+\tan A.\tan A'+\tan A.\tan\gamma']}$$

Now put

$$\tan\gamma'=\frac{cx'}{cy'}, \text{ and } \frac{\Omega}{b}=\mu,$$

and then we obtain finally:

$$cy'=(2.\mu+cx').\tan(A'-A)$$

which is the new expression for cy', which, if μ is constant, does not contain b the blade width. This means, therefore, that the angles of the blade φ are no longer influenced by blade width, and conversely that by increasing the blade width of an airscrew the thrust will be increased in the same proportion if $\frac{V}{n}$ is constant. It is well known, however, from model experiments that the thrust does not increase in the same proportion as the blade width, and this was accounted for on the previous theory by assuming that a larger inflow speed was obtained by increasing the blade width, thereby reducing the angle of attack α', and hence the thrust per unit area. It is by no means certain, however, that this loss of thrust must not be sought for in the mutual interfering action of one blade upon another, and not entirely, if at all, in the supposed augmentation of inflow velocity in front of the blade. It is evident that the new hypothesis outlined above represents the opposite extreme to the previous one employed. In the previous theory, *all* the air was supposed to be usefully employed in producing thrust, so that any further increase in thrust could only be obtained by supposing that the speed of inflow in front of the disc was increased, that is that such inflow was thus made to be dependent upon blade width. In the new theory the whole of the ring annulus is *not* necessarily taken to be employed, with the result that an increase in thrust does not entail an increase in inflow speed, but instead the employment of a larger percentage of the ring elements composing the airscrew disc—*i.e.*, a larger value of the coefficient f. It is probable that these two theories represent extremes, neither of which are fully realised in practice, and a more correct process would probably include to some extent a modification of both the hypotheses upon which they are respectively founded.

It should be noted, however, in passing that the value assigned to the coefficient μ does not uniquely determine the magnitude of the interference between the blades, the probability being that however large the ratio

$$\frac{\text{distance between consecutive blade paths}}{\text{blade width}}$$

there will be some sensible interfering action, which will become greater as this ratio is diminished with consequent loss of thrust per unit area. For the present, however, such refinements as those outlined above must of necessity be ignored in the analytical treatment of the subject, and the following analysis, whilst not being considered to be by any means complete, will at any rate serve to show the other side of the problem, and may possibly indicate the road by which a connection between the two extremes contemplated in the two hypotheses will eventually be established. Returning, then, to the analysis, we see immediately that the work is now in a much simpler form, and that the design of an airscrew by this method may be proceeded with at once without having to employ the tedious trial and error process of finding the blade width constant which was unavoidable in the previous theory. The formula established is given by :—

$$cy' = (2.\mu + cx').\tan(A' - A)$$

which for purposes of design, gives :

$$\tan A' = \frac{cy' + \tan A.(2.\mu + cx')}{2.\mu + cx' - cy'.\tan A}$$

and this may be more conveniently expressed by :

$$\tan A' = \tan(\theta + A)$$

i.e. $$A' = \theta + A,$$

where : $$\tan\theta = \frac{cy'}{2.\mu + cx'}.$$

This transformation is very convenient when finding approximate values of the thrust, torque, and efficiency. Consider first the efficiency of a blade element, expressed by :

$$\eta = \frac{\tan A}{\tan(A' + \gamma')}$$

and making the substitution ; $A' = A + \theta$, we obtain :

$$\eta = \frac{\tan A}{\tan(A + \theta + \gamma')}.$$

Now A is fixed by the $\frac{V}{n}$ value, since $A = \tan^{-1}\left(\frac{V}{2.\pi.n.x}\right)$ hence for a given $\frac{V}{n}$ value, at any radius x, A is constant, and therefore $(\theta + \gamma')$ must be a *minimum* for a maximum value of η.

Now $\theta + \gamma' = \tan^{-1}\left(\frac{cy'}{2.\mu + cx'}\right) + \tan^{-1}\left(\frac{cx'}{cy'}\right)$.

Hence this expression must be a minimum, and this will determine the best values of cy' and cx' to employ for any section along the blade, knowing the blade section. For blade sections having a thickness/chord ratio of about 0·08, the angle α' corresponding to a minimum value of $(\theta + \gamma')$ appears to lie between zero and -1 degrees. Hence we can write, since $(\theta + \gamma')$ is independent of A ;

$$\eta = \frac{\tan A}{\tan(A + \lambda)},$$

where λ = the *minimum value of* $(\theta + \gamma')$.

Regarding now A as the variable, it is at once evident that η is a *maximum*, when

$$A = \frac{\pi}{4} - \lambda/_2.\ \textit{i.e.},\ A = 45 - \lambda/_2 \text{ degrees}.$$

The maximum value of the efficiency at some point on the blade will then be :

$$\eta_{max} = \left[\frac{1 - \tan\lambda/_2}{1 + \tan\lambda/_2}\right]^2$$

This gives a value of about 78 per cent. efficiency for modern airscrew sections as tested at high speeds in the wind-channel. It is evident, therefore, that the remainder of the blade will be considerably *less efficient* than this value. This brings us naturally to the question whether airscrew sections having a purely two-dimensional flow at high speeds are not considerably more efficient than tests in a wind-channel on corresponding sections appear to show, where the air speed is much less and the total flow over the model wing varies very much from the purely two-dimensional flow contemplated in the airscrew theory.

We may now consider the total efficiency of an airscrew blade in the light of the foregoing theory.

The efficiency is given by :

$$\eta' = \frac{V}{2.\pi.n.}\cdot\frac{\displaystyle\int_{r_0}^{r} x^2.cy'.b.\sec A'.(1 - \tan A'.\tan\gamma').\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^2.dx}{\displaystyle\int_{r_0}^{r} x^3.cy'.b.\sec A'.(\tan A' + \tan\gamma').\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^2.dx}$$

Now since $A' = \theta + A$, we can substitute in the above, and then :

$$\eta' = \frac{V}{2.\pi.n.}\cdot\frac{\displaystyle\int_{r_0}^{r} dx.x^2.cy'.b.\sec(\theta + A).[1 - \tan\gamma'.\tan(\theta + A)]\left[\frac{1 + \tan A.\tan(\theta + A + \gamma')}{1 + \tan(\theta + A).\tan(\theta + A + \gamma')}\right]^2}{\displaystyle\int_{r_0}^{r} dx.x^3.cy'.b.\sec(\theta + A).[\tan\gamma' + \tan(\theta + A)]\left[\frac{1 + \tan A.\tan(\theta + A + \gamma')}{1 + \tan(\theta + A).\tan(\theta + A + \gamma')}\right]^2}$$

and we shall now regard cy' and cx' as constants, as well as θ, and then integrate over the blade.

This formula applies to any blade outline b or $c'.f(x)$, but a simplification can be introduced if the function $f(x)$ be made equal to the distance between consecutive blade paths. This form of blade outline may be called the "Rational" blade; it is similar to that described by Lieut. A. R. Low, R.N.V.R., and was employed by the writer in previous work on this subject.

The substitution for $f(x)$ is given by :

$$f(x) = \frac{\sin A'}{N.n}\cdot\left[2.\pi.n.x - \frac{\sigma}{2}\right]$$

i.e. $$f(x) = \frac{2.\pi.x.\sin A'}{N}\cdot\frac{(1 + \tan A\ .\tan(A' + \gamma'))}{(1 + \tan A'.\tan(A' + \gamma'))}$$

whence substituting in the expression for η', we obtain :

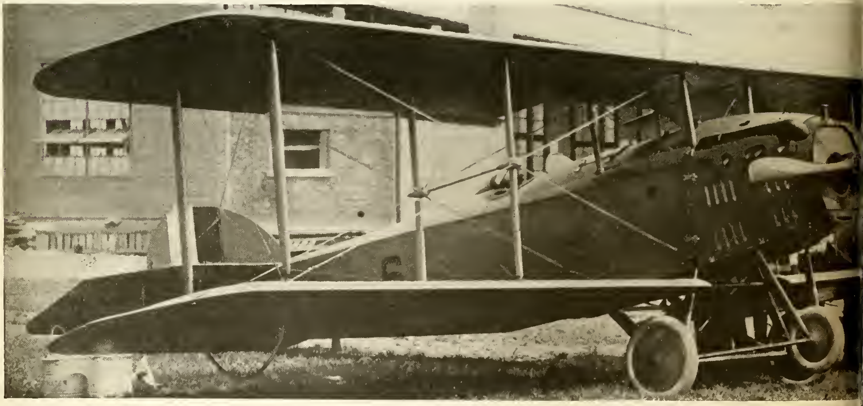
$$\eta' = \frac{V}{2.\pi.n.}\cdot\frac{\displaystyle\int_{o}^{D/_2} x^3.cy'.\tan A'.(1 - \tan A'.\tan\gamma').\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^3.dx}{\displaystyle\int_{o}^{D/_2} x^4.cy'.\tan A'.(\tan A' + \tan\gamma').\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^3.dx}$$

and the substitution: $A' = A + \theta$, cy' = constant, cx' = constant, θ = constant, will then enable the above expression to be easily evaluated.

A curve of η' against Z is given in Fig. 3, for fairly representative values of cy' and cx', as an example of how the efficiency varies with variation in the $\left(\frac{V}{n.D}\right)$ ratio. A maximum value of η' appears from this curve to occur at a value of Z of about 2, the values of η' for $cx' = 0$, forming an extreme case which in practice cannot be realised owing to the fact that cx' can never be zero. The lowest curve is taken from the ordinary wind-channel results on wing-sections, and is probably too low owing to the influence of aspect ratio already mentioned. Since the flow over

USHERING IN THE AGE

The Flying Staff of the Aerial Mail Division. From left to right they are: Messrs. Harry L. Hartung, Second Assistant Postmaster-General Praeger, G. L. Conner, chief clerk to Mr. Praeger; E. Leroy Langley, Ed. V. Gardner, Captain B. B. Lipsner, Maurice A. Newton, Max Miller, Robert Shank. One hundred percent plus is the record maintained by the Aerial Mail aviators. The mail must go rain or shine—and the pilots are maintaining the best traditions and reputation of the Post Office Department.



Line Up of Aerial Mail Aeroplanes—Standards eq

ERIAL TRANSPORTATION

The Expert Mechanical Staff of the Aerial Mail Division. On the left is Mr. Conner, assistant to Second Assistant Postmaster Praeger; in the center, Captain Benjamin B. Lipsner, superintendent of Aerial Mail Division. The others are the expert mechanics, Henry Wacker, E. N. Angle, A. F. Cryder, Ed. C. Roll, Wm. C. Read, W. O. Beatty, Chas. King, A. C. Dannielle

150 h.p. Hispano-Suiza Motors, and postal aviators

airscrew sections is supposed to be purely two-dimensional in character $\left(\frac{cx'}{cy'}\right)$ will have *smaller* values than those obtained from the ordinary wing sections as tested in the wind-channel. To obtain more correct values of cy' and cx', it would be necessary to test an aerofoil of very high aspect ratio in the wind-channel, and obtain the values for the *mid-section* of the wing, where the flow may be taken as being two-dimensional only. A third curve is given in the figure which has been obtained by taking probable values for cy' and cx' when the flow is strictly two-dimensional. These curves then indicate how the "designed efficiency" of an airscrew may vary with variation of $\left(\frac{V}{n.D}\right)$. It is possible also that the value of μ may vary with variation of cy' and cx', the curves having been plotted for $\mu = 1{\cdot}2$. It should also be borne in mind that these curves apply only for a form of blade that *increases with increase in radius, i.e.*, that is widest at the blade tip; such a form is not generally employed in practice, and is probably not as efficient as one having a maximum blade width nearer the boss.

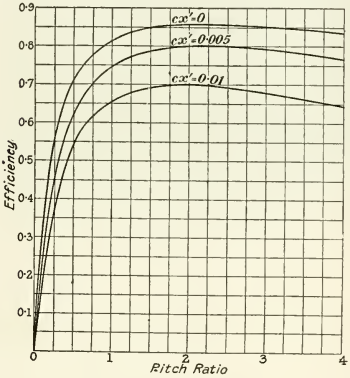


FIG. 3

The formula for efficiency from which these curves have been obtained is expressed by:

$$\eta' = \frac{Z.[12.E.Z^3 - 6.\pi.F.Z^2 + 4.\pi^2.G.Z + 3.\pi^3.J]}{\pi.[-6.J.Z^3 + 4.\pi.M.Z^2 + 3.\pi^2.F.Z + 4.\pi^3.E]}$$

where E, F, G, J, and M are coefficients depending upon the blade sections, and having values of respectively:

$$E = \tan\theta.(\tan\theta + \tan\gamma')$$
$$F = \tan\theta.(1 - \tan\gamma'.\tan\theta) + (1 - \tan^2\theta).(\tan\theta + \tan\gamma')$$
$$G = (1 - \tan^2\theta).(1 - \tan\gamma'.\tan\theta) - \tan\theta.(\tan\theta + \tan\gamma')$$
$$J = \tan\theta.(1 - \tan\gamma'.\tan\theta)$$
$$M = (1 - \tan\gamma'.\tan\theta).(1 - \tan^2\theta) + \tan\theta.(\tan\theta + \tan\gamma')$$

The formula for η' is obtained by integration of the formula already given, and variation of η' with the blade section coefficients must be obtained by variation of the values of the coefficients given above.

We can in the same way obtain an approximate formula for the thrust delivered by a helicopter of constant blade width, and this should form a good check upon the assumptions underlying the theory, since the conditions are then varied to an extreme degree. The results given by the theory for this case appear to agree quite well with experiment, thus confirming to some extent the new hypothesis. The two formulæ obtained for the helicopter are as follows:

$$\frac{W}{H} = \frac{4{,}400.\mu.cy'}{3.\pi.n.D.[(2.\mu + cx').cx' + cy_1^2]}$$

or eliminating n by means of the H.P. equation:

$$H = \frac{(\cdot 0121).W^{3/2}}{\mu^{\frac{5}{2}}.cy_1^{\frac{3}{2}}.N^{\frac{1}{2}}.b^{\frac{1}{2}}.D^{\frac{1}{2}}}.\psi$$

where

$$\psi = [(2{\cdot}\mu + cx').cx' + cy_1^2].[(2{\cdot}\mu + cx')^2 + cy_1^2]^{3/4}$$

and ψ will then have a *minimum-value* for some value of cy' and cx'. Taking $y = 1{\cdot}2$, and putting

$$\lambda = \frac{N.b}{D} = \frac{\text{Total blade width}}{\text{Diameter}}$$

we obtain:

$$W = H^{\frac{2}{3}}.D^{\frac{2}{3}}.\lambda^{\frac{1}{3}}.(25{\cdot}7).\psi^{-\frac{2}{3}}$$

which is of the usual form.

For an Eiffel No. 56 section, ψ had a minimum value of 4·45, giving an angle (φ) to the plane of rotation of about 10½ degrees, and an angle of attack (α') of about 4 degrees.

The necessary revolutions for any given case can be obtained at once from the formula containing (n).

Recapitulating, the process of designing any given airscrew is therefore as follows:

1 Determine test values of α' for each section along the blade, knowing for which value in each case $\theta + \gamma'$ is a minimum. This will usually occur between -2 and zero degrees. This fixes the values of cy' and cx' to be employed in the design.

2 Choose the forward speed V—*i.e.*, the "top speed" or otherwise, and knowing the revolutions of the motor (n), A is known, since $\tan A = \frac{V}{2.\pi.n.x}$, for any radius ($x$).

3 Determine the A' values along the blade from the formula:

$$cy' = (2.\mu + cx').\tan(A' - A)$$

or

$$\tan A' = \frac{cy' + \tan A.(2.\mu + cx')}{2.\mu + cx' - cy'.\tan A}$$

taking a value of $\mu = 1{\cdot}2$ or otherwise as determined from experiment.

4 To each A' value add the corresponding α' value for the radius considered, obtained from (1) above.

5 Knowing $f(n)$ the blade width outline curve, plot the integral curve:

$$y = x^3.cy'.f(x).\sec A'.(\tan A' + \tan\gamma').\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^2.dx$$

for each value of x chosen, and then integrate into the planimeter between the limits r_0 and r.

6 Knowing the value of the torque integral from (5) in the correct units, the blade width constant (C') is given by:

$$C' = \frac{550.H}{8.\pi^3.n^3.N.\rho.\ \text{Area of integral curve}}$$

Then the true blade widths at each radius (x) will be:

$$b = c'.f(x).$$

An estimate of the probable value of the "correction factor," employed in the theory which ignores inflow and slip altogether, may be made from the formula:

$$\frac{1}{f} = \frac{C'}{c} = \frac{\int_{r_0}^{r} x^3.f(n).cy.\sec A.(\tan A + \tan\gamma).dx}{\int_{r_0}^{r} x^3.f(x).cy'.\sec A'.(\tan A' + \tan\gamma')\left[\frac{1 + \tan A\ .\tan(A' + \gamma')}{1 + \tan A'.\tan(A' + \gamma')}\right]^2.dx}$$

In a particular case for a two-bladed propeller of constant blade width of 8 feet diameter rotating at 1,400 revolutions per minute, and having a forward speed of 63 miles per hour, the value of $\frac{1}{f}$ was found to be equal to $\frac{100}{67}$. This particular propeller over-revd as might be supposed. This formula merely serves as a check upon the assumptions upon which this new hypothesis is based, and it was employed for the same purpose in the writer's former paper, "The Screw Propeller in Air."

There is one very characteristic point of dissimilarity between the present method and all the previous theories—namely the question of the best angle of attack to employ for maximum efficiency. By all the previous hypotheses, this angle should be that corresponding to a maximum value of the Lift/Drag ratio of the section considered, which means that the angle has a value between 2° and 4°. In the present theory, however, this is by no means true, the angle of attack for best efficiency being that corresponding to a *minimum* value of the function

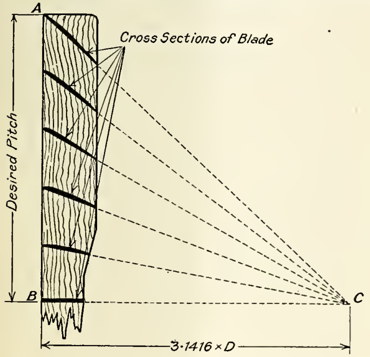
$$\tan^{-1}\left(\frac{cy'}{2.y+cx'}\right)+\tan^{-1}\left(\frac{cx'}{cy'}\right)$$

It will be noticed that the second term contains the criterion for maximum efficiency given by the other theories, the addition on this new hypothesis of the other term substantially modifying the values at which this minimum occurs.

THE PITCH OF AN AIRSCREW

By F. J. CAMM

One of the chief difficulties confronted by the aeromodellist–lies in the design of the screw. This is practically the most important component of the whole machine, since excellence of work and design with regard to the other components are rendered void if the means of transmitting the power into work are inefficient. Fig. 1 shows the method of setting out the angles along the blade of a screw—the same method applies both for full size and model practice. First a line is laid off to any convenient scale, equal in length to the perimeter of the disc swept by the propeller during revolution. Another line is now laid off at right angles to the former, and, to the same scale, a distance equal to the desired pitch, and a triangle is thus constructed. Now divide up the line A B into any number of equidistant parts and connect these to the angle C, as shown; three points, however, are usually sufficient for propellers up to 12 inch diameter. These angles correspond to the angle required at the various points along the blade. For convenience a sketch of the propeller blade is included in the sketch and the cross sections at the same points shown.



By pure trigonometry, therefore, knowing pitch and diameter, or any two other factors, it is possible to obtain the third.

The table, which is reproduced from an early chapter to avoid cross reference, shows the pitches of screws for various diameters and pitch angles, calculated from the formula:—

$$P=\pi\ d\ \tan A$$

where P = pitch

$\pi = 3{\cdot}1416$

d = diameter

tan A = constant of the angle = tangent of tip angle.

TABLE OF PITCHES OF AEROPLANE PROPELLERS

Diam.	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	40°	42°	44°	45°
6″	1·98	2·65	3·32	4·01	4·7	5·41	6·13	6·86	7·62	8·39	9·19	10·02	10·89	11·78	12·72	13·70	14·73	15·82	16·97	18·21	18·85
7″	2·31	3·09	3·88	4·68	5·48	6·31	7·15	8·01	8·89	9·19	10·73	11·69	12·70	13·74	14·83	15·98	17·18	18·46	19·80	21·24	21·99
7·5″	2·48	3·31	4·16	5·01	5·87	6·76	7·66	8·58	9·52	10·49	11·49	12·53	13·61	14·73	15·89	17·12	18·41	19·77	21·22	22·76	23·57
8″	2·64	3·53	4·33	5·34	6·27	7·11	8·17	9·15	10·15	11·19	12·26	13·36	14·51	15·71	16·95	18·26	19·64	21·09	22·62	24·27	25·14
8·5″	2·81	3·75	4·71	5·68	6·66	7·66	8·68	9·72	10·79	11·89	13·03	14·20	15·42	16·69	18·01	19·40	20·87	22·41	24·05	25·79	26·71
9″	2·97	3·97	4·99	6·01	7·05	8·88	9·19	10·29	11·42	12·59	13·79	15·04	16·33	17·67	19·07	20·54	22·09	23·73	25·46	27·31	28·28
9·5″	3·12	4·19	5·26	6·35	7·44	8·56	9·70	10·87	12·05	13·29	14·56	15·93	17·23	18·65	20·13	21·69	23·32	25·14	26·88	28·83	29·85
10″	3·30	4·41	5·54	6·68	7·83	9·01	10·21	11·43	12·69	13·99	15·32	16·71	18·14	19·64	21·19	22·96	24·55	26·37	28·29	30·34	31·42
10·5″	3·47	4·64	5·82	7·01	8·22	9·46	10·72	12·01	13·32	14·69	16·09	17·54	19·05	20·62	22·25	23·97	25·78	27·68	29·70	31·86	32·99
11″	3·63	4·86	6·09	7·35	8·62	9·91	11·23	12·58	13·96	15·39	16·86	18·38	19·96	21·60	23·31	25·11	27·02	29·00	31·12	33·38	34·56
11·5′	3·80	5·08	6·37	7·68	9·01	10·36	11·74	13·15	14·60	16·09	17·62	19·21	20·86	22·58	24·37	26·25	28·23	30·32	32·53	34·89	36·13
12″	3·96	5·20	6·65	8·02	9·40	10·81	12·25	13·72	15·23	17·16	18·39	20·05	21·77	23·56	25·43	27·39	29·46	31·63	33·95	36·41	37·70

ANOTHER GRUMBLE ABOUT GLUE

By Dr. W. R. DRUSHEL, Recently of Kent School at Yale, Now in charge of the Chemical Research Division of the Haskelite Manufacturing Corporation, Grand Rapids, Michigan

IN a recent issue of the AERIAL AGE the author of the article on "A Grumble About Glue" has opened for discussion a vital question closely related to the production of aircraft. It is pretty well agreed that the proper material for a very considerable part of an aeroplane or hydro-aeroplane is wood in laminated form. With the rapid exhaustion of timber suitable for making solid wood parts the importance of laminated or plywood becomes increasingly great.

To make plywood obviously some suitable form of cementing material, or glue, is essential. Certain qualities in the cementing material are, of course, necessary and others are highly desirable. A glue should have adhesiveness in a high degree, the degree depending to some extent upon the use to which the plywood is put. A glue should not deteriorate through bacterial action, nor through vibration in use. For much of the aircraft work a glue should be water-resistant. Specifications for a glue which met the requirements of cabinetmakers a few years ago are wholly inadequate for aircraft work. A glue which may be admirably suited for making furniture may be wholly unfit for use in aircraft production due to the vastly different uses and degrees of exposure of the finished products.

Progress is being made in the development of glues which will meet the requirements of the more severe tests of aircraft work. This, however, does not excuse the use of glues which are obviously not intended to meet the more severe requirements in aeroplane work, and specifications should carefully differentiate between glues which are satisfactory adsives in the absence of moisure and those which retain their adhesiveness in a high degree when the plywood is water saturated.

It is well known that certain grades of cabinetmaker's glue which are satisfactory in the moderately dry climate of the west and middle west are wholly unsuited for use on a product to be used in the humid climate of the Atlantic seaboard. If it is commercially important to select cabinetmaker's glue to withstand the climate of the Atlantic seaboard, how much more important is it to use a highly water-resistant glue in the production of aircraft which is certain to be exposed to all kinds of weather conditions? In order that a plywood may be classed as water-resistant or water-proof it should not merely fail to fall apart when in a water saturated condition, but the glue should be of such a quality that it still retains a very large per cent of its adhesiveness in the water saturated condition of the plywood. Why should a glue be called water-proof or water-resistant if its adhesiveness in water-soaked panels falls to ten or twenty per cent of its strength in the dry state? Is it not becoming of vital importance to ascertain the strength of so-called water-proof glues under the most severe weather conditions? If a glue is to be used in Naval aircraft work especially is it not highly essential that it should be really water-resistant? There are on the market today glues advertised to be absolutely water-proof which in the water saturated condition have only a very small per cent of the adhesive strength which they posses in the dry condition. Is it fair to call such a glue water-proof or water-resistant? It is commonly assumed that a glue is sufficiently strong for plywood if the wood fibre is torn away when the plies are pulled apart. If this is an acceptable test for any glue in a dry panel, why should a water-proof glue not be put to a similar test in a water-soaked panel? If a shearing test is set for the glue in a dry panel, why should there not be a shearing test specified for a water-proof glue in a water-saturated panel in order to ascertain if the glue is really entitled to be called water-proof?

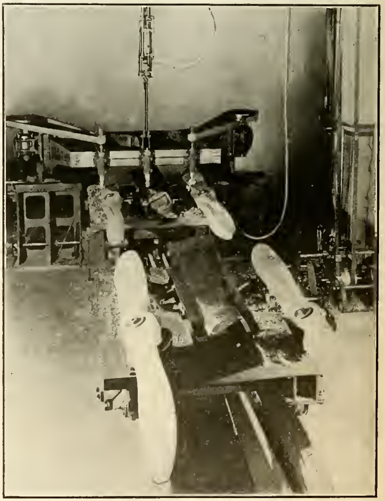
Suppose a glue said to be water-proof should dissolve to the extent of 30 per cent of its weight when soaked in water for a day, and suppose further that the water extract should prove to contain the adhesive qualities of the glue while the water insoluble residue should be correspondingly poor in adhesive properties, should such a glue be called water-proof or water-resistant? Obviously not. Such a glue would surely lose its adhesive power when subjected to the action of moisture for some time, and should at best be classed as semi-water-resistant.

Possibly the best way to improve a product is to set a high standard of excellence and let the manufacturer put forth his best efforts to meet the required standard. In order to improve the quality of the glues to be used in aircraft work it will be well first to classify properly the glues in use, determine the limits of each class and set specifications which each class shall meet. Then from time to time as each class is improved the specifications may be made more rigid. So long as manufacturers are permitted to sell water-soluble glues as water-proof, and semi-water-proof glues as absolutely water-proof and water-resistant, no real progress will be made toward the improvement of the various types of glues now available.

For many purposes water-soluble glues are good enough; for other purposes semi-water-proof glues will answer, and for still other purposes only really water-proof or water-resistant glues should be used.

A promiscuous and unintelligent use of the different types of glues not only leads to a general condemnation of all glues but it also discourages investigation aimed at the improvement of the several types of glues.

In view of the servere weather conditions which aerial work must meet, I shal venture to suggest that glues for aircraft work ought to be classified as non-water-resistant, semi-water-resistant and water-resistant; and that specifications for each class be so drawn as to distinguish the three grades. Such specifications should compel a proper classification and stimulate investigation which will improve each grade.



The Keller Propeller Carving Machine

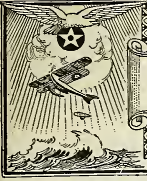
The Keller Mechanical Engraving Company have brought out a new machine for making propellers which should help, materially, the much needed production of propellers.

Their engineers have been untiring in rendering valuable assistance by giving the propeller manufacturers a completely worked out *method* and *real* service in addition to the machine.

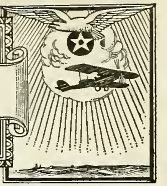
The machine is about 38′ long, and about 14′ across at the widest part.

It is supplied regularly with two carriages or work tables, on each of which is mounted a model for one-half of the propeller, and on each side of the latter, one or more blanks to

(*Continued on page* 1193)



NAVAL *and* MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to District Manager, Production, 870 Woodward Ave., Detroit, Mich.

Note 3—Report to Bolling Field, Anacostia, D. C.

Note 4—Report to Fort McPherson, Ga.

Note 5—Report to O i/c, Fisher Body Corp. Detroit, Mich.

Note 6—Report to Madison Barracks, Sacketts Harbor, N. Y.

Note 7—Report to Aviation General Supply Depot, Americus, Ga. Wire DMA.

Note 8—Report to Aviation Section, Newport News.

Note 9—Report to Aviation Mechanics' School, St. Paul, Minn.

Note 10—Report to Lieut. Colt, Metz Motor Co., Waltham, Mass.

Note 11—Report to Army Balloon School, Lee Hall, Va.

Note 12—Report to Manager Finance Bureau Aircraft Production, 870 Woodward Ave., Detroit, Mich.

Note 13—Report to Hoboken, N. J.

(Special Orders Nos. 174-177 Inc.)

A

Apelt, Cary P.	LHV
Acton, Gene William	SLA; CRI
Allinger, Daniel T.	SMM
Adams, Orson, Jr.	WFO
Athey, Clifford D.	FRF
Addington, Edward P.	TFT
Auchard, Oliver C.	TFT
Anderson, Edwin F.	DIK
Abel, Allison A.	DIK
Altman, Harry L.	KST
Armstrong, Russell Bernard	SLA; KST
Alexander, George Lehner	SLA; BFT
Andrews, John Parke	SLA; CFT
Ailsworth, Richard Earle	SLA; KST
Agee, William Tillmon	SLA; BFT
Allen, George Albert	SLA; BFT
Ashby, William Todd	SLA; BFT

B

Brady, Frank L.	DIK
Brown, Raymond F.	DIK
Barnes, Harold L.	ASM
Bell, William H.	ASM
Berglung, Eugene N.	ASM
Brown, Reuben J.	ASM
Belting, John Theodore	SLA; CRI
Bacon, Max E.	GLC
Batten, Eugene C.	GLC
Blain, John D.	GLC
Brock, William Archibald	SLA; BFT
Bridges, Kenneth Lawler	SLA; CWT
Bramlette, James L.	VBW
Bradens, William M.	GLC
Baughan, Stephen, D.L.	GLC
Blair, Byron S.	GLC
Bassett, Lowell Whittier	SLA; LDT
Botts, Graeme Gayle	SLA
Burns, Edward	DMA
Burton, Charles Vance	SLR; CSO
Barnes, James A.	APR
Baldwin, Thomas S.	MJR
Bicknell, George Waldo	SLR; ALF
Blackburn, James M.	EOT
Bogel, Galitzin, N.	EOT
Bishop, Albert B.	CJS
Blackler, Perry W.	BST
Brown, Harry M.	DAF
Blanchard, Francis E.	DIK
Barnes, Earl D.	BST
Berger, Andrew B.	CPR
Beckford, George F.	DIK
Burrows, Paul Edmund	SLA; SBI
Byrnes, Ralph John	SLA; SBI
Beutell, Russell L.	FRF
Brainerd, Walter M.	FRF
Brown, Harry G.	DIK
Bailey, Augustus O.	DIK
Barnard, William T.	DIK
Boonstra, Henry George	SLA; CRI
Barker, Charles M.	PFO
Brown, Ernest L.	PFO
Barnhart, Leroy W.	PFO
Boone, Ralph R.	DIK
Belsky, Charles J.	DIK
Batty, John H.	LHV

FOREIGN NEWS

FRANCE

An official statement on aviation says: "During the month of July 184 enemy aeroplanes were downed. One hundred and fifty-four enemy aeroplanes were seen falling out of control inside the enemy lines, of which number fifteen had been damaged by the fire of our aircraft guns. Thus 338 enemy machines were destroyed or badly damaged."

French aviators again participated in the battle on Aug. 9th, in conjunction with the infantry, harassing the enemy with bombs and machine guns. Our squadrons took part in several battles in the air, in the course of which fourteen German aeroplanes were downed. Nine captive balloons were set afire.

Our formations dropped more than twenty-three tons of projectiles on troops assembled in the valley of the Avre and other parts of the battle-zone as well as in the rear. During the night our airmen threw nearly seventeen tons of bombs on the stations at Ham, Tergnier, Nesles, and Hombleux, and on several bivouacs, causing fires and explosions.

Gen. von Einem's son, who was a crack aviator of the German flying corps, was shot down inside the French lines recently and is now a prisoner of war.

French airmen have been very active in harassing the retiring enemy. Enemy concentration points around Lassigny were bombarded heavily, causing heavy German losses.

French aeroplanes to the number of 120 dropped twenty-three tons of bombs in the battle area on Aug. 11.

"During the day of Aug. 11 our bombing squadrons carried out successful expeditions over the enemy lines. Concentration centers, road crossings, bridges, and railroads were copiously drenched with projectiles.

"Marching columns were sbjected to machine gun fire. The important center of communication of Porquericourt received for its part seventeen tons of explosives during the day.

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"Marching columns were subjected to machine gun fire. The important center of communication of Porquericourt received for its part seventeen tons of explosives during the day."

Numerous transports have been bottled up. A total of fifty-seven tons were dropped, of which twenty-two tons fell during the night on the regions of Ham, Noyon, Guiscard and Tergnier.

The same day fifteen aeroplanes and four captive balloons were downed, and twenty-one machines were put out of action by our pilots, operating in collaboration with American crews.

On the night of Aug. 12-13 our bombarding aeroplanes dropped twenty-nine tons of bombs on stations and enemy establishments at Tergnier, Ham, Nesles, St. Quentin, and Noyon. Fires are reported to have been seen at several places.

On the 12th eleven German aeroplanes were brought down or put out of action. Four captive balloons were destroyed.

Aviation—Our crews have downed or put out of action twelve German machines. On the night of Aug. 13-14 our bombing machines dropped thirty-two tons of projectiles on enemy objectives. Tergnier, St. Quentin, Ham and Noyon, bivouacs in the region of Ognolles and the railroad stations at Maison Bleue, Guigni-court and Chatelet-sur-Tourne were copiously bombarded. Violent fires broke out at Ham and Noyon, which received as their share fifteen tons of explosives.

GREAT BRITAIN

"On August 7 observation was rendered difficult by grounded mist. However, a considerable amount of reconnaissance and photography was carried out. Over seventeen tons of bombs were dropped during the day with good results, and a large number of combats took place. Fifteen hostile machines were brought down and seven driven down out of control. Two of our machines are missing.

"A ton of bombs was dropped during the night, when operations were hampered by bad weather. One of our night-flying machines is missing."

The following official communications was issued by the air ministry:

"On the morning of the 8th our machines carried out a successful attack on the explosive factories at Rombach (Alsace Lorraine, ten miles north-west of Metz). Good results were obtained. All our machines returned."

Allied aeroplanes are making it hot for German towns, according to advices reaching London. Their acitivities have increased within the last ten days, forcing the enemy to detach a large number of fighting machines from the front in order to protect the menaced towns.

During a recent raid over Saarbrucken the allied aviators encountered forty German fighting planes. This is regarded as an indication of the very serious moral as well as the military effect that the air raids are having on Germany.

The statement of Aug. 9 reads:

On Aug. 8 our aeroplane squadrons co-operated with other arms on the battlefront throughout the day. The line reached by our attacking infantry was reported by our contact aeroplanes. The position of the hostile artillery in action and columns of German infantry and transport on the march were signaled to our guns by our artillery machines. Other machines supplied our advance troops with ammunition from the air.

Co-operation with the tanks was carried out systematically. Our machines assisted the tank crews with information, attacked strong points and other opposition with bombs and machine-gun fire, and by dropping smoke bombs along the line of their advance assisted to conceal the approach of the tanks from the enemy.

Our contact machines working with the cavalry rendered valuable service. Flying low in front of our advancing line, our fighting squadrons shot at and bombed the enemy in his retreat, causing havoc among the masses of hostile troops and transport on roads congested with traffic.

Our bombing squadrons flying a few hundred feet from the ground attacked trains, railway junctions, and bridges.

Forty-eight hostile machines are reported as destroyed by our aeroplanes and seventeen others were driven down out of control. Five hostile balloons were shot down in flames. Fifty of our own machines are missing, most of these casualties being due to fire from the ground. One of our night-flying machines also failed to return.

On Aug. 9 our airmen continued the work of co-operating with the British infantry, artillery, cavalry and tanks on the battlefront. German troops and transport were again attacked with bombs and machine-gun fire from a low height whenever a suitable target offered. The Somme bridges were heavily bombed by day and night.

Elsewhere along the British front the activity in the air has been slight.

The official communication issued on Aug. 11 says:

On Aug. 10 there was intense fighting in the air, mainly over the battle area.

Forty-one enemy machines were destroyed during the day, and twenty were driven down out of control. Twelve of our machines are missing.

Twenty-three and one-half tons of bombs were dropped by our airmen in the course of the day, and thirty-one tons, principally upon bridges and stations in the Somme Valley, during the following night.

The work of reconnoissance and observation for artillery fire was actively carried on along the whole front, while co-operation with the other arms in the battle has been actively continued.

The amount of small-arm ammunition fired from the air upon retreating enemy troops and transport has broken all recent records. On the night of Aug. 10-11 two hostile night bombing machines were brought down by us. The first was a giant German machine with five engines and a heavy load of bombs.

Anti-aircraft fire has also shot down two other enemy machines during the last two days.

French aviators again participated in the battle Friday in conjunction with the infantry, barassing the enemy with shells and machine guns. Our squadrons took part in several battles in the air, in the course of which fourteen German aeroplanes were downed. Nine captive balloons were set afire.

Our formations dropped more than twenty-three tons of projectiles on troops assembled in the valley of the Avre and other parts of the battle zone, as well as in the rear. In the course of the night our airmen threw nearly seventeen tons of bombs on the stations at Ham, Tergnier, Nesies and Hombleaux and on several bivouacs.

An official communication issued by the Air Ministry announced that an air raid has been made on Karlsruhe. It was stated that there was an explosion in the Karlsruhe station.

The communication of Aug. 12, reads:

"On the afternoon of the 11th instant, in addition to the bombing previously reported, a few bombs were dropped on the triangle of railways at Metz.

"On the night of the 1th-12th instant our machines attacked two hostile aerodromes and various ground targets with bombs and machine gun fire.

"On the day of the 12th inst. one of our squadrons, despite unfavorable weather conditions, successfully attacked the aeroplane and chemical works at Frankfort. Bursts were observed well in the center of the objectives. Large numbers of enemy aeroplanes attacked and kept up a running fight for about thirty miles. Two enemy aeroplanes were destroyed. All our machines returned safely.

"Another of our squadrons attacked the hostile aerodrome at Hagenau with excellent results. This squadron, just after crossing the lines, met large numbers of enemy aeroplanes and at once decided to give battle. As the result of severe fighting four enemy aeroplanes were destroyed and one other machine was driven down out of control. Two of our machines are missing.

"The squadron reformed after this fight and proceeded to bomb its objective. A direct hit was obtained on a large hut in the aerodrome and a bomb fell among four enemy machines on the ground and destroyed them."

GERMANY

The German official report for Aug. 8 said:

There has been very lively aerial activity over the battlefield. We have shot down twenty-three more enemy aeroplanes and one captive balloon.

German general headquarters issued the following statement on Aug. 12:

Seventeen enemy aeroplanes and four captive balloons were shot down yesterday. In July, 518 enemy aeroplanes were shot down by our airmen on the German front and 69 by our anti-craft guns. Thirty-six captive balloons also were shot down. Two hundred and thirty-nine of these aeroplanes are in our possession and the others were seen to fall inside the enemy's position. We lost 129 aeroplanes and 63 captive balloons in battle during the same period.

The German statement of Aug. 14 says:

"A British bombing squadron on its way to raid our home territory was engaged by our chasing forces before reaching its objective and forced to return after a loss of five aeroplanes.

"Yesterday twenty-four enemy aeroplanes and one hostile balloon were shot down."

An official despatch received at Geneva on Aug. 15 from Frankfort, Germany, says that Monday morning at 9 o'clock that city was attacked by twelve enemy aviators, who dropped twenty-six bombs, killing twelve persons and injuring five others.

Reports from Basel, however, assert that the casualties were far more numerous. These say that a bomb fell in the crowded Kaiserstrasse, killing many persons and stopping the street cars; that another fell in the middle of the large station and several in its vicinity, while two more fell in the barracks, and still another near Goethe's house, which was undamaged.

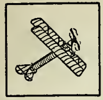
The Basel despatch says the aerial attack has increased the panic in the Rhine towns.

ITALY

The War Office statement issued on Aug. 12 says:

Along the whole front the fighting activity has been moderate.

Five hostile aeroplanes were downed by us. Flying over Feltre and the Seven Communes, Italian aeroplane squadrons attacked from low heights recognizable hospitals. Patients and other persons were killed.



MODEL NEWS

Edited by John F. McMahon

CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulovard, Bay Ridgo, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md.
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass
MODEL AERO CLUB OF OXFORD
Oxford, Pa.
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Model Aeroplane Building as a Step to Aeronautical Engineering

The construction of the Tail, Rudder and Fin needs no explanation other than the dimensions in the accompanying drawing. One thing must be remembered, that is, to make these members as light as possible without sacrificing strength.

The model builder must remember that every ounce of weight on the tail means about eight ounces at the nose in order to bring the center of gravity where it should be, at a point over the thumb and indicated by the arrow in the side view sketch shown at the bottom of the drawing.

These parts are covered with silk and placed in position as shown in the sketch of tail and rudder assembly. The tail should be fastened rigidly but the rudder should be so fastened as to allow free movement to set rudder in order to correct the turning of the model caused by the twist of the propeller, or when attempting to do stunts in the air.

When assembled the model should be doped with the celluloid solution described in an earlier issue. (Numerous inquiries have been received as to the amount of celluloid and banana oil used in this combination. A piece of thin transparent celluloid, 4x4" dissolved in a pint of pure banana oil will give the best results. If the banana oil is not pure it will turn white when dry.

The propeller is cut from a block of soft white wood ¾" thick to the shape shown in the sketch. It is made fairly heavy in order to hold the nose of the machine down and to assist in properly locating the center of gravity. In fact the propeller can be made to weigh as much as two to three ounces, and even with this weight it might be necessary to put an extra ballast in the nose of the machine because the center of gravity must come at the point shown in the sketch. The model can be balanced easily by holding as shown in the sketch, if the tail is heavy it will be necessary to put an additional weight at the nose of the machine. Should the nose be heavy you need not worry, because a little nose heaviness does not harm the flying qualities much, and this can be corrected by giving a slightly greater angle of incidence to the main planes; or a little lesser or negative to the tail plane.

When attempting to fly the model I would advise selecting a field where the grass or weeds are long because the model may be a little "out of balance" and make a sharp nose dive or "sit on its tail" and the long grass will act as a cushion.

The model builder should have little trouble laying out and assembling the model, the Plan, Front and Side views should give all the information necessary.

If the instructions I have given are strictly carried out, the model builder will have little trouble in making the model fly 250 to 500 feet. (I might call attention to the measurements of the fuselage through an error, I forgot to state that the dimensions given alongside of each strut in the side view and at the bottom in the top view, shows the length of the struts and not width of the body. For instance, the greatest dimension given was 1⅞" adding the thickness of two ⅛" longerons will make the body 2⅛" which is correct).

To finish the model paint Red, and blue stripes on the rudder as indicated in the drawing, Red at the rudder post and equal space of white and blue outside. The circles on the wings are, outside red, next blue and the inside circle left, white.

We will take up the construction of a compressed air motor next.

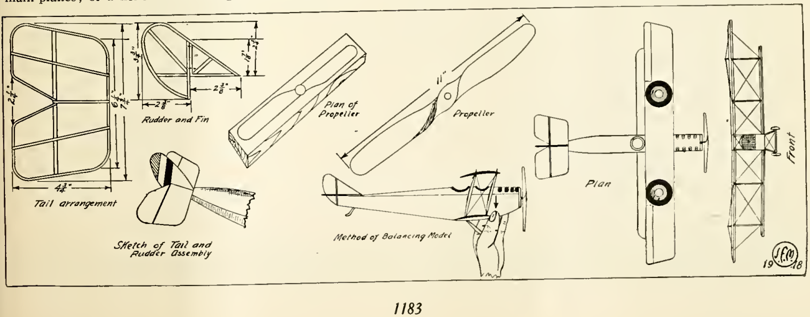
(To be continued)

Correspondence Model Aero Club of Rockford, Illinois

Mr. F. Spalding, who was a former member of the "Correspondence Model Aero Club of Babylon, L. I.," now disbanded, notifies me he is about to start a club of the same name with its headquarters at Rockford, Illinois.

He would like to hear from former members of the older club, as well as other model builders, or beginners who would like to follow up Elementary Aeronautics. Mr. Spalding says the trouble with the old club was mismanagement and failure to answer inquiries. This will be entirely overcome by a system Mr. Spalding has in mind.

His address is No. 320 N. Main Street, Rockford, Illinois. Model readers will note the addition of two new clubs to the list at the top of the page.



Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The American Eagle-Man

By H. F. Greaves, 1st Lt., A.S.S.C., A.E.F., France

I

Blue spreads the sky above me
Gentle blows the Western wind,
I trundle the little "pursuit" out
And closely tuck me in.

II

The "Liberty" hums a merry tune
And seems eager to be off,
I gently wave the "mechs" aside
And swiftly soar aloft.

III

Below me spreads the country-side,
With camp and village, hill and mead;
I note the rivers silvery thread
And softly guide my flying steed.

IV

This is the life for bird and man,
My soul exultant is and glad,
While unbidden memory conjures up
The magic carpet of Bagdad.

V

I sit and dream of fairy tales,
Of Pegasus' wonderful horse,
Of twenty league boots and flying chests
And they seem a matter of course.

VI

I travel far on wings of the winds,
I see all the wondrous sights
That gladden the American Eagle's eye
Or dwell in Arabian Nights.

VII

Swiftly above the clouds we rise,
My magic steed and I,
And on the sheeny-fleecy things
We look down from on high.

VIII

Again we view the landscape o'er,
'Tis truly Mother Nâture's lap.
And wrest the very secrets from
This ever-changing map.

IX

The trench, the gun, the tortuous road,
The wood or farmhouse grey,
I fix the menace or harmlessness
Then quickly speed away.

X

Sometimes we meet the dragon foe,
Then by virile or baffling loop,
We elude his deadly firey breath
And swiftly on his tail we swoop.

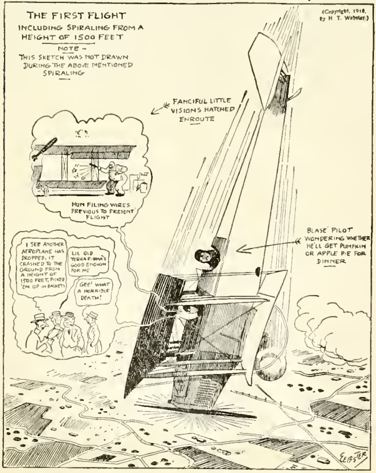
XI

Ofttimes the bursting shrapnel shells,
Like pursuing Trolls come after,
But soon we maneuver out of reach
Or pass them by with laughter.

XII

Then when the day is ended,
And golden-red is dyeing the West.
We gladly take the homeward route
And spiral down to rest.

The Thrill That Comes Once in a Lifetime. —**By Webster.**


THE FIRST FLIGHT
INCLUDING SPIRALING FROM A HEIGHT OF 1500 FEET
NOTE – THIS SKETCH WAS NOT DRAWN DURING THE ABOVE MENTIONED SPIRALING
(Copyright, 1918, by H. T. Webster)
FANCIFUL LITTLE VISIONS HATCHED ENROUTE
HUN FILING WIRES PREVIOUS TO PRESENT FLIGHT
BLASE' PILOT WONDERING WHETHER HE'LL GET PUMPKIN OR APPLE PIE FOR DINNER
I SEE ANOTHER AEROPLANE HAS DROPPED, IT CRASHED TO THE GROUND FROM A HEIGHT OF 1500 FEET, PICKED 'EM UP IN BASKETS
LIL OLD TERRA FIRMA'S GOOD ENOUGH FOR ME
GEE! WHAT A HORRIBLE DEATH!
WEBSTER

Courtesy Evening Globe

At it, Boys!

I see some airships sailing,
A-sailing off so far,
And oh, they are all laden
With bombs for the Kai-zar.

There are bullets in the cabin,
And shrapnel in the hold,
The sails are all of linen,
And the masts of beaten gold.

The captains are all Yankees,
With khaki on their backs,
And when these ships begin to move
They'll drive the Germans back.

The Germans, they are brazen
With their bombs of Hellish gas,
But the Yankees, they will beat them
With the good old cannon sass.

F. B. S.

From Home

It doesn't make us very gay,
To know that you have gone away
To educate the Kaiser;
But we are very proud of you,
And know you'll do a thing or two
To make the old chap wiser.

—*W. P. N.*

Airplane Parts!

We supply such parts as:

Steel Tubing
Stabilizer Tubes
Push Rod Tubes

Tubing formed per B/P's and straight tubing in diameters ranging from ¼″ to 2½″, 14 gauge (.083″) to 22 gauge (.028″)

Special Rod Assemblies

Rims of all sizes to government specifications

Bearings
Tire Rims
Springs
Forgings.

For ten years we have made oval and "D" shaped tubing for the Curtiss Airplane Co.

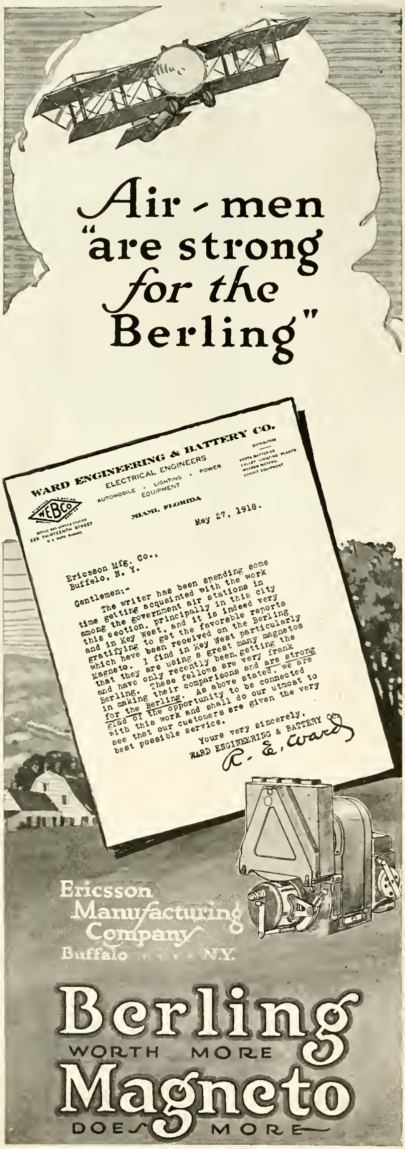
Let us help you make your estimates.

Write us for information at once before you submit your bids for airplane construction.

The factories of this company have been among the foremost in the field of motor-driven vehicles since the earliest days of the industry. Our engineering department and our laboratories are among the most complete in the world.

The Standard Parts Company, Cleveland, Ohio, U. S. A.

Famous for Stanweld Rims, Tubing, etc., Perfection Springs, Bock Bearings, Axles, Perfection Heaters, Forgings, Hubs, etc., etc.



WARD ENGINEERING & BATTERY CO.
ELECTRICAL ENGINEERS
AUTOMOBILE · LIGHTING · POWER
EQUIPMENT
WEBCo
MIAMI, FLORIDA

May 27, 1918.

Ericsson Mfg. Co.,
Buffalo, N. Y.

Gentlemen:-

The writer has been spending some time getting acquainted with the work among the government air stations in this section, principally in this city and in Key West, and it is indeed very gratifying to get the favorable reports which have been received on the Berling Magneto. I find in Key West particularly that they are using a great many magnetos and have only recently been getting the Berling. These fellows are very frank in making their comparisons and are strong for the Berling. As above stated, we are glad of the opportunity to be connected with this work and shall do our utmost to see that our customers are given the very best possible service.

Yours very sincerely,
WARD ENGINEERING & BATTERY CO.
R. E. Ward

(Continued from page 1162)

labor apply only to common labor at the present time, these restrictions will, as soon as possible, be extended to include skilled labor. In the meantime, recruiting of skilled labor for war production will be subject to Federal regulations now being prepared.

This drastic change in the Nation's labor program has been found necessary in order to protect the employer and the employed, to conserve the labor supply of the communities and to cut down unnecessary and expensive labor turn-over (which, in some cases, is as high as 100 per cent a week), and to increase the production of essential.

While non-essential industries will be drawn upon to supply the necessary labor for war work, the withdrawal will be conducted on an equitable basis in order to protect the individual employer as much as possible.

Under the operating methods adopted, the country has been divided into thirteen Federal districts, each district in charge of a superintendent of the U. S. Employment Service. The States within each district are in turn in charge of a State Director, who has full control of the service within his State.

In each community there is being formed a local community labor board, consisting of a representative of the U. S. Employment Service, a representative of employers and a representative of the employed. This board will have jurisdiction over recruiting and distributing labor in its locality.

A survey of the labor requirements is being made, and in order that each community may be fully protected, rulings have been issued that no labor shall be transported out of any community by the U. S. Employment Service without the approval of the State Director; nor shall any labor be removed by the Service from one State to another without the approval of the U. S. Employment Service at Washington. Every effort will be made to discourage any movements from community to community or State to State by any other service.

This labor program has the approval of all producing Departments of the Government, through the War Labor Policies Board.

It must be understood that farm labor will be protected, for the industrial program distinctly includes special efforts to keep the farmer supplied with labor.

The requirement that unskilled labor must be recruited through the sole agency of the U. S. Employment Service does not at present apply in the following five eases:

1. Labor which is not directly or indirectly solicited.
2. Labor for the railroads.
3. Farm labor—to be recruited in accordance with existing arrangement with Department of Agriculture.
4. Labor for non-war work.
5. Labor for establishments whose maximum force does not exceed one hundred.

When the survey of labor requirements has been made and the aggregate demand for unskilled labor in war work is found, each State will be assigned a quota, representing the common labor to be drawn from among men engaged in non-essential industries in that State.

These State quotas will in turn be distributed among localities. Within each locality, employers in non-war work, including those who are only partially in war work, will be asked to distribute the local quotas from time to time amongst themselves. Quotas by localities and individuals are to be accepted as readily as they are for Liberty Loan and Red Cross campaigns. This plan of labor quotas is a protection for all communities.

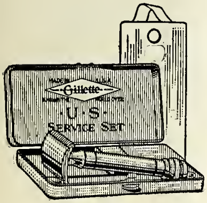
The object is to keep any community from being drained of labor, and to use local supply, as far as possible, for local demand. The situation, however, is such that in certain cases some men may have to be tranported over long distances.

You will note from the above outline that this is probably the most drastic action that the Government has taken since putting the National Army draft into effect. The absolute necessity for this program can be seen when it is realized that in Pittsburgh, for instance, there are advertisements calling for men to go to Detroit; while in Detroit street cars there are posters asking men to go to Pittsburgh. This same condition is apparent all over the United States and in the consequent shifting of labor a great part of our war effort is dissipated.

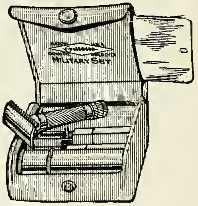
Because this is one of the greatest problems facing the nation today, we are asking that you give this matter your careful consideration. You will probably desire to carry some comment on this basic change in the Nation's labor methods, and we would suggest that if you desire to assign one of your men to look into this situation, the facilities of the Department of Labor and the U. S. Employment Service are at your disposal.

Yours respectfully,
J. B. Densmore, Director General.

Gillette SAFETY RAZOR



The New U. S. Service Set—A solid metal case, heavy nickel-plated and embossed with the Insignia of the U. S. Army and Navy. Strong, thin, compact: 1⅞ inches wide, 4 inches long, ⅝ inch thick. 12 double-edged Gillette Blades (24 Shaving Edges). Contains a nickel-plated Gillette Safety Razor and Blade Box. Indestructible Trench Mirror inside the lid. $5



Military Set No. 18—For Uncle Sam's Officers, a Gillette Combination Set, in case of U. S. Regulation Khaki twill — nickel-plated "Bulldog" Razor; indestructible Trench Mirror fitted in pocket in lid; Shaving Brush and Stick Gillette Shaving Soap in nickel-plated Holders; two Blade Boxes; 12 double-edged Gillette Blades (24 Shaving Edges). $7

The most practical of men is the fighting man

When it comes to razors, the fighting man wants his Gillette.

It saves him space. It saves him weight. It makes his shaving clean, quick, safe. It is the razor used by his bunky and his messmates — by his comrades under all the flags of the Allied Nations.

The Gillette is the *Service Razor* the world over.

Have you seen the new Gillette Sets specially made for the fighting man? Two of them are illustrated on this page. They were designed by members of the Gillette Organization in the Service — men who know what the fighting man is up against.

Simple and compact, fit the pack, the pocket or the ditty box. No strops or hones to clutter up the kit. Blades always sharp, always ready. No Stropping—No Honing. When a man wants new Blades he can get them in any Post Exchange, Ship's Canteen, or Y. M. C. A. Hut, here in America or overseas.

Our Paris Office carries stocks — is constantly supplying the American Expeditionary Forces. Gillette Safety Razors and Blades on sale everywhere in France, England, Italy, and the Eastern battle fronts.

Gillette Safety Razor Co.
of Canada, Ltd.
73 St. Alexander St.
Montreal, P. Q., Canada

Gillette Safety Razor Societe
Anonyme
17 Bis, Rue La Boetie
Paris, France

Here's the Way to Get 100% Efficiency Out of Your Gillette

Try this when you shave tomorrow morning. Lather the beard thoroughly, and rub well in — that's essential with any shave.

Put in a new blade and screw the handle down *tight*. If you want a specially close shave, *unscrew* the handle a *part turn*.

Hold the razor *naturally* and *easily*, and tilt the handle so you can just feel the blade engage the beard.

Then shave with short slanting strokes. It doesn't require any brute force to shave with a Gillette—the razor does the work.

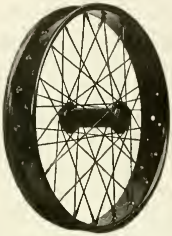
Gillette Safety Razor, Ltd.
200 Great Portland St.
London, W., England

A. G. Micheles
53 Liteiny, Petrograd, Russia

Vedova Tosi Quirino & Figli
Via Senato, 18
Milan, Italy

Gillette Safety Razor Company
Boston Mass·U·S·A·

National Wire Wheel Works, Inc.
***of* Geneva, New York**



J N 4
TYPE

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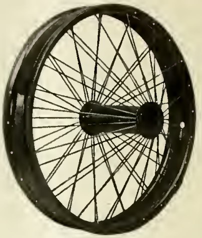
wire wheels made to fit
all types of Airplanes



PALMER
TYPE

DELIVERIES ARE PROMPT
WRITE FOR PRICES

Borden, John A	KST
Bovey, Sidney J	Note 8
Blodd, Frank L	Note 6
Baird, Walter Edward	SLA; RSD
Bass, Haskell Harris	SLA; GLC
Baker, Lee Allen	SLA; KST
Brown, George Harold	SLA; SBI
Blistain, George Anthony	SLA; SBI
Balderston, Jason Aldrich	SLA; BFT
Berkowitz, Ben	SLA; PMT
Brennan, Edward William	SLA; KST
Brown, Clarence Leon	SLA; SBI
Burk, Elmer Edgar	SLA; VBW
Bible, Dana Xenophon	SLA; CFT
Billett, Clifford H	CJS
Bramlette, Milton Nunn	SLA; SBI

C

Chisum, Yenner Y	CGC
Christie, Robert E., Jr	CPA
Cochran, Robert Bryce	SLA; CFT
Christy, Wynn Oliver	SLA; CFT
Coffee, Harold L	SLA; RSD
Cledinning, William R	ELA
Carlson, Arthur George	SLA; CFT
Cadmus, Lemont A	FLR
Christensen, Ezra A	BST
Cooper, Francis J	BST
Crandall, Gavin D	FRF
Cooper, Francis Judd	SLA; KST
Cronin, Maurice J	SLA; VBW
Carpenter, Frederick S	CPR
Catching, Harry H	GLC
Coffee, John A	DIK
Crumley, Charles L	FRF
Cotton, Horace George	SLA; RSD
Connelley, Iobert M	BST
Clouse, Oles I	DIK
Chatterson, Marshall C	PFO
Cowen, Edward G	FRF
Corbitt, Marsh M	PFO
Campbell, Donald	DIK
Christy, Donald C	GLC
Claude, Laurens	GLC
Clark, Hobart	BST
Croarkin, Paul C	LHV
Cather, Jay Howard	FLR
Chamberlain, Clarence Duncan	SLA; CRI
Cochran, Emory E	Note 4
Clayton, Wilbur Henry	SLA; VBW
Cullinan, John Francis	SLA; GLC
Cozier, Paul Merlin	SLA; RSD

D

Dhein, Orian Irvin	SLA; BFT
Dahlem, Earle C	FRF
Dunlap, Lionel H	TFT
Daly, George S	BST
Dunn, Thomas F	TFT
Draper, Arthur L	FLR
Donaghue, Harold R	TFT
Davis, Paul A	PFO
Dwyer, Lawrence P	PFO
Doles, John J	SMM
Dow, John R	BST
Donovan, Lawrence J	LHV
Day, Robert R	DIK
Dyer, Clarence A	DIK
Duggan, James R	DIK
Doty, David E	TFT
Duke, John F. S	DIK
Doering, Harold	EOT
Dawson, Joseph C	DIK
Dussere, Louis	PFO
Duryee, Andrew B	TFT
Davis, Clarke Fullerton	SLA; GLC
Drummey, John Francis	SLA; GLC
Davis, George Edward	SLA; RSD
Daly, George Sylvester	SLA; KST
Dubel, Marcus Gordon	SLA; CGC
deBettencourt, Danuel A	FRF
Doyle, Stanley Morton	SLA; KST

E

Elliott, Milton	SLA; BFT
Engblom, Oscar H	FRF
Eding, Gerrard J	CPR
Evans, Stephen G	FRF
Evans, Arthur Herbert	SLA; CRI
Elphinstone, Douglas C	CPR
Eustis, Truman W	CPR
Evans, Lawton B	BST
Easter, William C	TFT
Emery, Amos B	TFT
Evans, Edwin B	LHV
Elsey, George W	GLC
Eaton, St. John L	Note 5
Erney, Frederick Gordon	SLA; KST
Ely, Sherman Sheldon	SLA; CGC
Elliott, Merle Adams	SLA; RSD

F

Fitzgerald, Freeman Charles	SLA; PMT
Farnsworth, Tom D	SLA; CFT
Ferguson, Elijah P	CAF
Foster, Lee W	EOT
Fulwood, Charles W., Jr	EOT
Fisher, Ewing B	DIK
French, Seth T	BST
Fogg, Robert S	DIK
Foster Thad V	DIK
Friday, Ellsworth C	EOT
Ford, Edgar K	DIK
Folsom, Frank G	PFO
Frere, Henry Bertram	SLA; KST
Fowler, Robert A	HHN
Frost, Horace Wier	SLA

G

Griggs, Milton W	FLR
Gray, Murray K	SLA; VBW
Gregg, Harry W	CGC
Ghee, Milton P	LDT
Gault, John William	SLA; CWT
Gardiner, Chandler Brewer	SLA; CWT
Garwood, Sterling Marion	SLA; BFT
Grey, George V	MAT
Grosvenor, William	PUP
Gibson, Glen T	WFO
Garrett, Joseph R	EOT
Greene, Lew A	BST
Garrett, John W	TFT
Goddard, Glenn	DIK
George, George B	WFO
Glassco, James Spruill	SLA; GLC
Goetjen, Floyd Leslie	SLA; RSD
Garrison, Relph Hamilton	SLA; GLC
Gouin, Walter F	SLR; CJS.
Goodwin, Grover	SLA; RFT
Gehan, Jerome Standley	SLA; RSD
Goembel, William P	DIK
Guild, Paul Conard	SLA; CRI

H

Hill, Charles	DIK
Harter, Earl Clark	SLA; KST
Hogg, Edwin Ruvthen, Jr	SLA; PMT
Harper, Oliver C	GLC
Heston, Adrian, O	GLC
Hooker, Charles J	FRF
Hayward, Lawrence A	SLA; VBW
Hoffman, John S	GLC
Henderson, Albert H	DMA
Hilliard, Walter B	DMA
Horn, Norman Elmore	SLA; PMT
Hawkridge, Leslie D	FLR
Hardey, Donald E	FRF
Hitt, Arnold D	SMM
Hayes, Martin A	FRF
Handwerck, Morris C	FRF
Hansen, James H	EOT
Heath, Edward D	EOT
Hopkins, Ward D	EOT
Harris, George E	FLR
Harrigan, Cornelius H	EOT
Honn, Laurence C	EOT
Hickman, Cecil R	DIK
Hornig, William F	DIK
Houlton, Raymond C	DIK
Hosier, John B	BST
Hastings, Charles E., Jr	GLC
Heinitsch, George M	LHV
Haines, Harold H	ASM

Hunter, Archie D.	PFO
Hastings, Charles E., Jr	GLC
Hillix, Albert F	TFT
Haugen, Karl M	DIK
Harvey, Harold M	TFT
Hutchins, Benjamin B	Note 13
Hoddick, Alvin C	Note 13
Henry, Kenneth Malcolm	SLA; DAP
Horn, Malchior H	HHN
Hahnel, William John	SLA; CWT
Harrington, John Patrick	SLA; KST
Hawkinson, John Leland	SLA; SBI
Harper, Maitland Curgenven	SLA; PMT
Hayden, Arthur Dorr	FLA; DAP
Hooker, Joseph Kilbourne	SLA; DAP
Hayes, Charles Lee	SLA; KST
Hanson, Bert J	FRF
Hogan, William Neil	SLA; BFT
Howard, Elmer Newton	SLA; BFT
Henderson, Hugh Murphy	SLA; BFT
Hudspeth, Clyde Everett	SLA; KST
Herring, William Douglass	SLA; DAF
Harrigan, Thomas F	DIK
Harding, Rowland R	DIK

I

Ihrig, Howard Kirsch	SLA; CAF

J

Johnson, George Teho	SLA; KST
Johnson, Perry V	PFO
Jackson, John S	PFO
Jones, Ernest E	DIK
Jones, Donald T	DIK
Jones, William F	DIK
Jones, Stanley B	ASM
Jacoby, John E	Note 2
Johnson, Raymond Charles	SLA; BFT
Jacobs, Sydney Bradshaw	SLA; DAP
Judge, Joseph B	FRF
Jones, Donald Turner	SLA; DAF

K

Knoblock, Frederick L	SRC
Kane, Clarence P	DMA
Kile, Neil Everett	SLA; TFT
Kesler, Gerald L	DIK
Kennedy, Marcus J	FLR
Kuhn, Herbert R	DIK
Kirby, Marquis L	BST
Keiner, Carl W	DIK
Kerr, Henry D	WFO
Kraus, Edwin J	PFO
Kultgen, John H	EOT
Kinnebrow, Edward R	LHV
Korman, Howard	DIK
Kent, Thomas T	GLC
Kinkade, Kennish C	DIK
Koch, Albert N	DIK
Klingaman, Earl J	DIK
Keeler, John F	Note 9
Krug, Frank W	SLA; TFT
King, Charles	FRF

L

Lundgren, Theodore S	EOT
Lowe, Herman J	LHV
Lawton, William Wallace	SLA; PMT
Loesel, George O	GLC
Lenoir, Whitman H	PFO
Lundgren, Edgar E	PFO
Little, Roy A	FRF
Lenderking, Louis T., Jr	DIK
Larkin, JohnA	CPR
Lawson, Harry E	PFO
Luddy, Joseph L	PFO
Leche, Eric D	DIK
Lea, Royal B	TFT
Linman, Luke E	DIK
Leslie, John W	WFO
Lathropm, Julian L	FRF
Lawhon, Guy B	DIK
LaMonte, Edwin B	DIK
Liensch, Charles F	GLC
Lundberg, Henry Benjamin	SLA; CFT
Lowry, Edward Brockway	SLA; CWT
Locklear, Ormer Lester	SLA; BFT
Lutz, Ernest Welch	SLA; KST
Love, Lewis	SLA; DAF
Leonhardt, Elmer George	SLA; GLC
Levitt, Glenn B	DIK
Lawton, William W	FRF
Lyall, Paul Crouse	SLA; EOT
Leisure, George S	FRF

M

Mathews, Herbert Stephen	SLA; CWT
Myers, George I	DIK
Miller, Felix B	DIK
Mueller, Paul W	SLA; VBW
Moise, Harold	SLA; DAF
Morris, David B	EOT
Magill, James W	FRF
Morriss, Charles W	FRF
Murphy, Charles C	FRF
Mallette, Lester D	WFO
Maxwell Warren A	FRF
Midyette, Dayton R., Jr	EOT
Mallory, Louis C	LHV
Magee, Christopher	PFO
Martin, Milton R	PFO
Miller, Charles E	PFO
Mengel, Herman	TFT
Moore, James M	PFO
Mabry, Harry C	FRF
Marberry, Jason M	DIK
Morgan, Diodate	DIK
Miskovsky, Robert J	FRF
Morehead, Hobart Emmett	SLA; RSD
Martin, John H	FRF
Moon, Harold F	DIK
Miller, Boynton K	WFO
Mayfield, Hollace E	DIK
Mason, Edward J	DIK
Mayor, Herbert C	DIK
Mayo, Robert C., Jr	SMM
Mason, Chauncey C	DIK
Moynihan, Frederick M	DIK
Martin, Leo C	SMM
Miller, Daniel W	DIK
Miller, Charles F. H	WFO
Mitchell, Donald H	TFT
Magee, Richard Hartnett	SLA; CWT
Myers, Devereux M	Note 3
Mahannah, Alva Ernest	SLA; CWT
Metzger, Bernard Lewis	SLA; SBI
Macks, Robert G	SLA; LDT
Markham, John A	Note 8
Murphy, Clement John	FRF
Moore, Benjamin Logan	SLA; CAF
Morgan, William T., Jr	SLA; CFT
Miller, Eugene John	SLA; TFT
Mast, Walter Emanuel	SLA; CFT
Mauce, Leonard D	DIK
Mahan, John Henry	SLA; GLC
Moon, Frank L	RSD

Mc

McClees, Ralph Lewis	SLA; SBI
McGraw, Will C	BST
McDowell, Alfred Alexander	SLA; RSD
McCormick, Ralph C	EOT
McGrath, Michael F	EOT
McCormack, Earl N	FRF
McKnight, Ewell	SLA; CWT
McGehee, Abner F., Jr	EOT
McGlone, John P	DIK
MacLean, Norman R	DIK
McCabe, Roscoe E	GLC
McDonald, James Ellis	SLA; RSD
McCaffrey, Harry F	DIK
MacNeil, Bruce	MAT
McAdow, Lewis H	Note 7
MacDonald, Neil C	Note 3
McDowell, Lloyd James	SLA; KST

N

Nolan, Philip Edward	SLA; GLC
Newcomb, Paul Herman	SLA; CFT
Norris, Fred Percy	SLA; RSD
Nester, John F	SLA; VBW
Neubauer, Arthur J	KST
Negley, V. W	FRF
Nelson, Luther	TFT
Neely, John E	DIK
Neubauer, George R	TFT
Newman, Augustus L	SMM
Noyes, Linwood I	FRF
Nelson, John H	DIK
Nolte, Julius M	DIK
Nolan, Philip E	DIK

O

Oertel, Robb Church	SLA; BFT
O'Hearn, Francis M	DIK
Orgill, Kenneth Willins	SLA; GLC
Ozier, Richard Paul	SLA; GLC
O'Neill, John Francis	SLA; LDT

P

Pottle, Vincent F	DMA
Pierce, Theron E	GLC
Peterson, Frank Lynn	SLA; DAF
Pearson, Robert	GLC
Pilkington, Fred W	FRF
Palmer, Hubert P	GLC
Parker, Harold	DIK
Payne, Franklin S	BST
Pavey, Smith W	BST
Pearson, Russell H	PFO
Parker, Kenneth H	DIK
Preble, Robert C	DIK
Pickard, Porter L	DIK
Pennebaker, Charles T	DIK
Packard, Harold A	FRF
Petraborg, Jerrold A	DIK
Pugh, Richard Owen	SLA; RSD
Pyatt, Kenneth Randolph	SLA; GLC
Pickard, Porter L	SLA; CAF
Penick, Mark Albert	SLA; CFT
Pinckney, Dunbar William	SLA; CFT
Pratt, Daniel Harry	SLA; KST
Perrin, Elmer Daniel	SLA; SBI
Peterson, Helge Anthony	SLA; CFT
Parker, Charles Wilson	SLA; GLC
Pierce, Leonard R	DIK

R

Rooney, Albert William	SLA; KST
Ries, Edward Fritz	SLA; PMT
Rice, Franklin Dryden	SLA; WFO
Rennebaum, Ernest Henry	SLA; CFT
Russell, Foster	SLA; DAF
Reeve, Orson L	SMM
Ross, Lucius G	SMM
Rodham, Clarence John	SLA; CGC
Ryder, Gerald Allen	SLA; KST
Rowe, Charles B	SLA; VBW
Robson, William Wallace	SLA; CFT
Rundle, W. B	SLA; KST
Ragsdale, Grover Cleveland	SLA; GLC
Roach, Howard Laverne	SLA; DAF
Reed, Max E	GLC
Ruegg, Joseph Arnold	SLA; DAF
Robinson, Fernando A	DIK
Roberts, Ray C	GLC
Ragsdale, Grover C	DIK
Ransome, Philip G	DIK
Radford, William A., Jr	DIK
Roehlk, John	DIK
Roberts, George L	PFO
Ramsay, Robert W	DIK
Ricciardi, Attilio	EOT
Rosenfield, Harold	Note 2
Rollins, Carson W	FRF

S

Stapleton, Charles Edward	SLA; KST
Snyder, Laurence Nelson	SLA; CAF
Simmons, Walter Clay	SLA; KST
Smith, Dean Cull	SLA; SBI
Sands, Austin L	EOT
Sands, Austin Ladyard	SLA; RWT
Shannon, Harold Evans	SLA; CRI
Smith, Albert, Jr	SLA; SBI
Starr, Robert Lyndon	SLA; SBI
Shepard, Frederick B	FRF
Streeter, Edward B	FRF
Seaton, John W	FRF
Squires, Paul R	FRF
Steinberg, John C	FRF
Slocum, Russell W	DIK
Schoonmaker. Earle Winslow	SLA; CWT
Slocum, Donald	SLA; BFT
Saal, Raymond Henry	SLA; KST
Spoffard, Benjamin D	FRF
Shaw, Harold Hughes	SLA; RSD
Schaefer, Julius E	FRF
Smith, George Daniel	SLA; CRI
Sanders, William Percival	SLA; KST
Smith, Andrew Raymond	SLA; KST
Sogge, Richard Charles	LA; GLC
Stalter, Charles C	SMM
Smith, Samuel R	DIK
Smith, Frederick K	EOT
Sultzer, Norman W	TFT
Sundstrom, Olaf	TFT
Sipe, Harold G	SLA; VBW
Shultz, Henry J	SLA; VBW
Shaw, Donovan L	HHN
Stanberg, Stanley Ray	SLA; EOT
Stenhouse, Lester Ulrich	SLA; KST
Smith, Wayne B	SLA; CGC
Stahlberg, Oscar A	SLA; VBW
Sale, William E	SMM
Sigward, Sylvester L	DIK
Swinson, Casper D	DIK
Schank, Harry E	FRF
Smith, Bernard R	GLC
Smith, Samuel Rex	SLA; RSD
Smith, Walter C	DIK
Smith, George M	TFT
Soule, Arthur Logan	SLA; KST
Sawyer, William G	DIK
Shay, Carleton C	PFO
Stites, James W	PFO
Southwick, Glen H	DIK
Shafer, Wayne	DIK
Stough, Robert A	DIK
Stacy, Owen P	DIK
Stewart, James D	LHV
Sandvigen, Gilbert T	GLC
Swain, Francis W	FRF
Sullivan, Charles W	DIK
Stephenson, George E	WFO
Sperry, Ernest L	DIK
Strickland, Chauncey J	Note 3
Schweser, Harold G	Note 11

T

Tillet, John	SLA; GLC
Thompson, Lyman H	RSD
Tyler, Oscar Wallace	SLA; KST
Thomas, Mark P	FRF
Towle, Ellingwood Hubbard	SLA; CFT
Tanner, Olav John	SLA; CFT
Thorne, William Bolster	SLA; RSD
Twaddle, Chester	SLA; CRI
Toll, Arne W	FRF
Thompson, Harry Scott	SLA; RSD
Tinsley, George C	FRF
Traer, Glenn W., Jr	SMM
Tupper, Wilbur D	DAF
Trefry, Howard Worcester	SLA; SBI
Tresidder, Don	SLA; SBI
Tighe, Louis T	DIK
Thomas, James R	BST
Thomas, Arthur E	DIK
Taylor, Thomas P	DIK
Tysowski, Joseph G	Note 13

U

Underwood, Thomas Ingle	SLA; PMT

V

Vandeveer, Harry Earl	SLA; GLC
Vernon, Charles Clark, Jr	SLA; CWT
Vieb, Walter F	DMA
Van Auken, Wendell Grant	SLA; CFT
Vivian, Harry M	DMA
Van Arsdale, Ray C	DIK

(*Continued on page* 1191)

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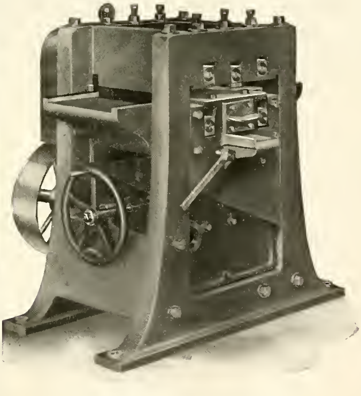

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"Am mailing the goggles under separate cover, and you can see for yourselves what an awful smash they got. Not a single piece of glass flew out. So, instead of not having eyes to see where to hit the Hun, I am as good as ever and back in the air every day.

"Assuring you that I am for Resistals until Kaiser Bill runs for President of the United States, and thanking you for the prompt delivery of another pair, I beg to be, Most gratefully yours"—(Signed by a Flying Cadet at Memphis, Tenn.—name on request.)

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(*Continued from page* 1189)

Vance, Alfred W.	CWT
Van Rossum, Clarence B.	DIK
Voorhees, Dayton	CPR
Voneiff, Herman A.	SLR; TFT
Von Thaden, Herbert	DIK
Venton, Wilaon L.	GLC
Van de Mark, Otis Stevens	CPA; DMA
Vessey, Burton F.	GLC
Van Alstyne, Charles G.	SLR; CGC
Vandemeer, Dirk J.	PWM

W

Wainer, Perry	PFO
Walker, William S.	DAP
Wuchter, Stanley A.	SMM
Willcox, Sydney G.	DMA
Waller, Alfred E.	GLC
Whittle, Amos B.	GLC
Wheless, William Meade	SLA; KST
Wilsey, Stanley Miller	SLA; VBW
Wirgman, Stewart Lux	SLA; KST
Witbeck, Robert R.	FRF
Wellons, Robert Andrew	SLA; SBI
Wright, Stanley Gray	SLA; SBI
Wilbur, Clifford H.	DIK
Whitehill, Deane Wright	SLA; CAF
Williams, Theodore	ELA
Weller, Joseph F.	CPR
Wade, Don D.	BST
Wimer, Frank B.	BST
Wall, William P.	DIK
Wheeler, Oliver P.	MAT
Weinhardt, Robert A.	CAF
Westcott, Reuel R.	EOT
Whittaker, Arthur L.	EOT
Westbrook, Virgil D.	MAT
Wrigley, Paul P.	PFO
Wellford, Armstead L.	FRF
Wing, Charles R.	DIK
Williamson, Harlan A.	BST
White, Julius A.	BST
Wehrell, Albert	TFT
White, Edward O.	DIK

Y

York, John Y., Jr.	KST
Young, Victor Morris	SLA; CAF
Young, Fred	SLA; RSD
Young, Carleton E.	DIK
Yost, Lloyd Oscar	SLA; BFT
Yackey, Wilfred A., Jr.	TFT

Z

Zabriskie, George Albert	SLA; SBI

Urges That One Man Head "Air Service"

Mr. Hugh L. Willoughby, Aeronautical Engineer, has written the following to "The Reservist":

The Chalet, Newport, R. I.,
August 3, 1918.

"Dear Sir:

"The reason that the 'Air Service' has got into such a terrible muddle lately is from the fact that there has been too many heads with authority to it.

"Congress voted all the money and more than was necessary to build 30,000 aeroplanes.

"This lack of centralized authority, capable of forming a fixed policy, was shown in the building of the Liberty motor, so many changes were made from time to time, that at the end of the year, the production was almost reduced to zero.

"The 'Air Service' is so different from the 'Sea Service' and the 'Land Service,' that it requires very different treatment.

"Men brought up in the other two services have to begin at the lowest round of the ladder before their education is complete for the navigation of the air.

"The importance of gaining the mastery of the air is now recognized by all military authorities.

"No Krupp gun can fire with any degree of precision, till the aeroplane gives it, by wireless, the range and the distance.

"No submarine can operate at sea if you have a preponderance of aeroplanes patrolling the sky.

"Lord Kitchener, before his death, stated that 'One aeroplane is worth an entire army corps,' and a member of Parliament recently said that the 'Air Service' of England was destined to be of greater importance than its navy.

"Our own Congress is going to be asked, and I have no doubt will give, the enormous sum of one billion dollars, in order to bring this war to an immediate and victorious end.

"Does not this important service deserve a new Cabinet Officer in Washington? 'The Secretary of The Air Service' to manage it.

"France had this one head five years ago, and England followed suit last year, in separating the 'Air Service' from both the army and navy.

"The press and the people seem thoroughly aroused to the appointing of this new Cabinet Officer.

"Major General Branker, Controller General of Equipment of the British 'Air Service,' made a powerful appeal recently for America not to fall into the error that England did in delaying the appointing of a centralized authority for this great service.

"Last Thursday, Senator Harry New of Indiana, a member of the Air Craft Investigating Committee of the Senate, gave notice that with the opening of Congress it was his intention to submit a bill, authorizing the appointment of the 'Secretary of Aeronautics.'

"In order to pass this bill, it will be necessary to bring to the attention of all members of Congress its vital importance.

"All the men in the Naval Service, who have the welfare of their country at heart, can do much by writing home and getting their influentian friends interested in the success of this bill.

"HUGH L. WILLOUGHBY,"
"Aeronautic Engineer."

Aircraft Resources Low

An extract from a captured German document, given herewith, is interesting.

The order is frank in explaining that, because of the reduced German strength, it frequently will be impossible to hold continuous trench lines, and recommends instead the creation of centers of resistance.

The document warns commanders that should the enemy obtain a foothold within the German lines they must consider carefully whether a counter attack is necessary or worth risking a large number of lives.

Another captured order informs the German regiments that they must provide their own defenses from low-flying Allied aeroplanes, as the German aircraft resources are so low that they cannot be expected to fight off the enemy while they are being engaged "on reconnaissance work." This order adds that complaints from units harassed by low-flying Allied planes will not be forwarded.

Aero Mail Head Thanks Hylan

Writing to Mayor Hylan on Aug. 12th, announcing that the operation of the aero mail service had been taken over from the military aviators by the Post Office Department, Benjamin B. Lipsner, superintendent of the Division of Aerial Mail Service, thanked him and patrons of the service here for their encouragement.

"The great city of New York has been brought closer to the national capital in point of time," he said, "and I believe closer in the matter of interest, by that speedy communication which accelerates business activity."

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Two Hundred Pounds of Aerial Mail Costs Only 50 Cents a Mile

About 50 cents per mile is the estimated cost by the Post Office Department of operating the Air Mail Service, according to the *Army and Navy Journal*. The total of all operating expenses of nine aeroplanes covering flights aggregating 7,234 miles was $3,682. The total consumption of gasolene representing 113 hours and 8 minutes of flying was 1,377 gallons, which is $32.50 per hour—something over 50 cents per mile. The total cost of gasolene was $405 in flying 7,234 miles.

The best performance in flying was made by a Curtiss J-N-4 machine, which flew 26 hours and 40 minutes at a coset of $28.01 an hour and covered 1,719 miles at a cost of 43½ cents per mile. A plane equipped with a Hispano-Suiza 150 horse-power engine used approximately eight gallons of gasolene per hour, and a plane equipped with a 400 horse-power Liberty motor used seventeen gallons per hour. This shows 48 per cent. less consumed than generally required for aeroplone engines of these sizes. The average consumption of gasolene for the nine planes was twelve gallons per hour.

Weekly Aero Mail in Canada

Toronto.—It is probable that the aerial mail route started Aug. 16 between Ottawa and Toronto will be maintained as a regular weekly service.

Seven Hun Aviators Buried By Americans

With the British Armies at the Front, Aug. 12.—American soldiers buried seven dead German airmen in a great hole made by a bursting bomb on a giant aeroplane the Germans sent over in the night for the purpose of bombing the British line of communications. This second hostile leviathan of the air descended during the battle and was caught in the rays of a searchlight north of Amiens and was brought down by the British.

It measured 135 feet spread and was provided with five motors, developing more than 1,500 horsepower, but with an estimated speed of only about sixty-five miles an hour. One of the big bombs it carried was either released just before the machine crashed or burst as a result of the fire when the machine struck the ground.

The Americans arrived on the scene soon after and interred the dead Germans in the hole they had made for themselves.

(*Continued from page* 1180)

be cut. While one set of blanks is being cut, those on the other table are being mounted so that the machine is constantly in action and is not stopped for loading or unloading.

When a cut has run out the table is quickly detached from the drive mechanism by pressing a lever and this table is pushed out of the operating range through the housings either backward or forward as the case may be) to make room for the other table on which a model and a set of blanks have previously been mounted and are now ready for cutting.

As the work table travels back and forth under the fulcrum arm carrying the tracer and the cutters which is free to swing up and down in a vertical plane, the tracer follows the undulations of the model causing the arm to swing correspondingly, so that the cutters reproduce in the wood the exact shape of the model, there being just enough weight on the arm to keep the tracer in contact with the model.

Quality of Product

The fundamental principle embodied in the design of this machine makes it possible to obtain a degree of accuracy far beyond the possibilities of most of the various types of machines now in use. The fact that, on the one hand, cutters and tracers are held on the same member. while, on the other hand, model and work are mounted on same table, not only makes it possible to obtain the greatest accuracy but enables much heavier cutting than would otherwise be possible. By cutting both ends from the same half model, a close approach to a perfect balance is obtained.

The shaping can be held very close to the finished dimensions and the surface left by the specially designed cutters, traveling at a high speed, is so smooth that no spoke shaving is required. The sanding, etc., required should not average more than about two hours on a propeller 8′ x 8″.

Uniform thickness is secured by very simple and convenient method of supporting the work.

The machine is capable of taking four of the training propellers of the Curtiss 8′ type simultaneously or two of the large types. The total time taken for two cuts—roughing and finishing—is forty-eight minutes which would make an average of twelve minutes per propeller when four are cut at once.

Four blade propellers can be handled as practically as two blade.

Operation:

The operation is extremely simple, every provision having been made to eliminate the need of any special skill on the part of the operator.

Before mounting, the laminated blanks should be accurately bored and faced parallel so that the hub is of correct thickness to begin with. The blanks are locked in correct position on special fixtures and are held rigidly in position at the hub by means of nuts; two quickly adjustable stops are brought up to the underside at the end of each blank.

A pneumatic chuck or suction device, securing and releasing instantaneously, is located between the stops and holds each blank firmly in the correct position during the cutting, eliminating the need of clamping mechanisms which might have a tendency to spring or distort the blank.

It has been found practical to machine rough blanks in one cut down to the finished size. If it is desired to have the propeller seasoned between the roughing and finishing cut, the practice is to rough cut a quantity down to about ¼″ of the finished thickness and eventually return them to the machine, mounting them on the fixture as before and making a finished cut to size. In that case the roughing cut may be taken at the full feeding capacity of the machine, the finishing cut being run at a finer feed.

Grinding Cutters:

The importance of correctly and nicely ground cutters being realized, a special motor driven grinder is furnished with the equipment arranged for handling the cutter blades in the simplest manner.

Models are made of hard wood and cut on the machine from a propeller which is considered correct.

Design and Construction:

The machine is well supported on heavy beams on which are mounted, planed and leveled heavy steel rails.

Cutters are readily ground to size in grinder supplied with machine. These are designed with a view to economy and speed in producing them. The blades are inexpensive to make and can be produced with a very small machine shop equipment. They run at 7,500 R.P.M.

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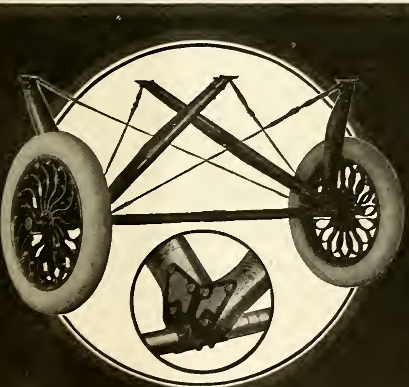

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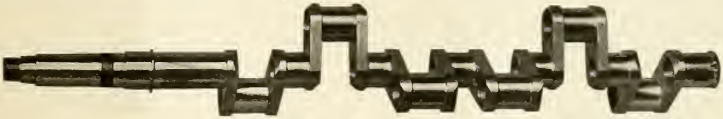

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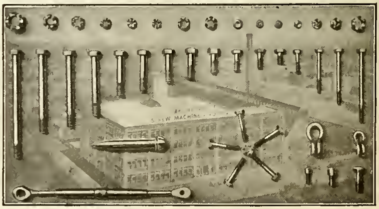

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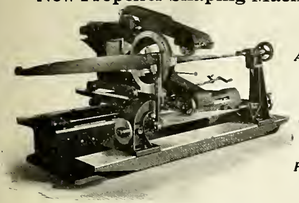

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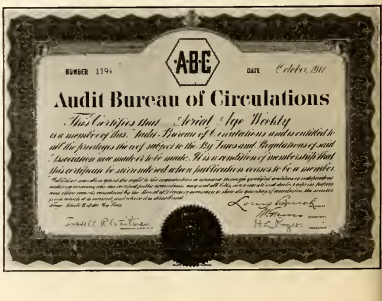

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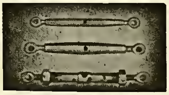

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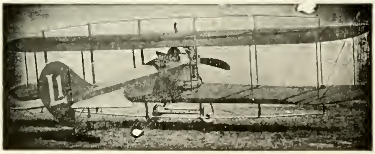

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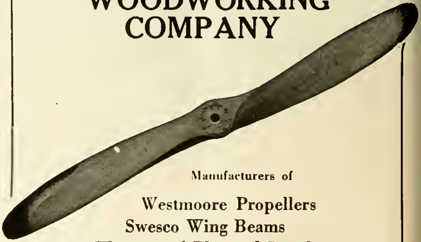

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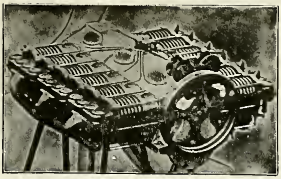

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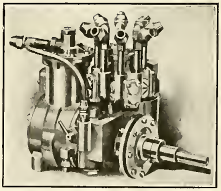

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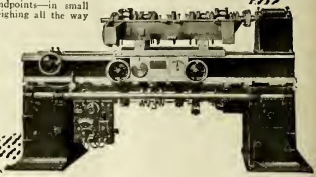

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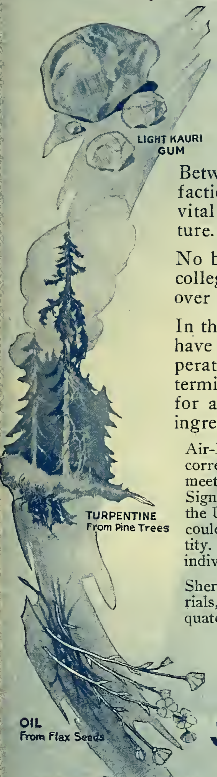

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10. Resist illuminating gas.
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13. Have proper covering qualities.
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Vol. 7, No. 25 SEPTEMBER 2, 1918 10 CENTS A COPY

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AERIAL AGE WEEKLY

Vol. VII SEPTEMBER 2, 1918 No. 25

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> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
>
> **Dated, March 11th, 1918.**

We offer single ply birch, maple, walnut, mahogany and red gum in sizes cut to order.

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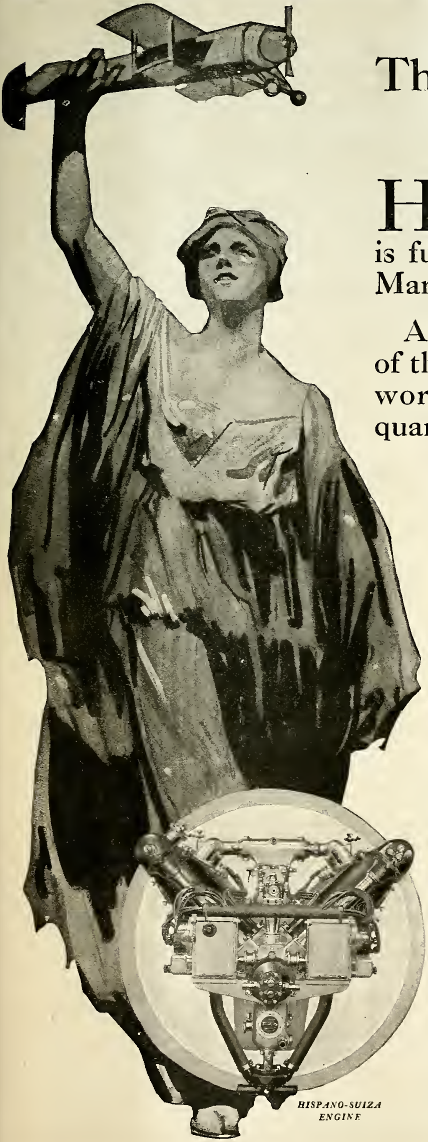

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HOW much America will need aircraft after the war is fully realized by the Wright-Martin Aircraft Corporation.

Although the present activities of the plant are directed to war work and the production in quantities of the famous Hispano-Suiza engine, plans are already made for the industrial needs of the future.

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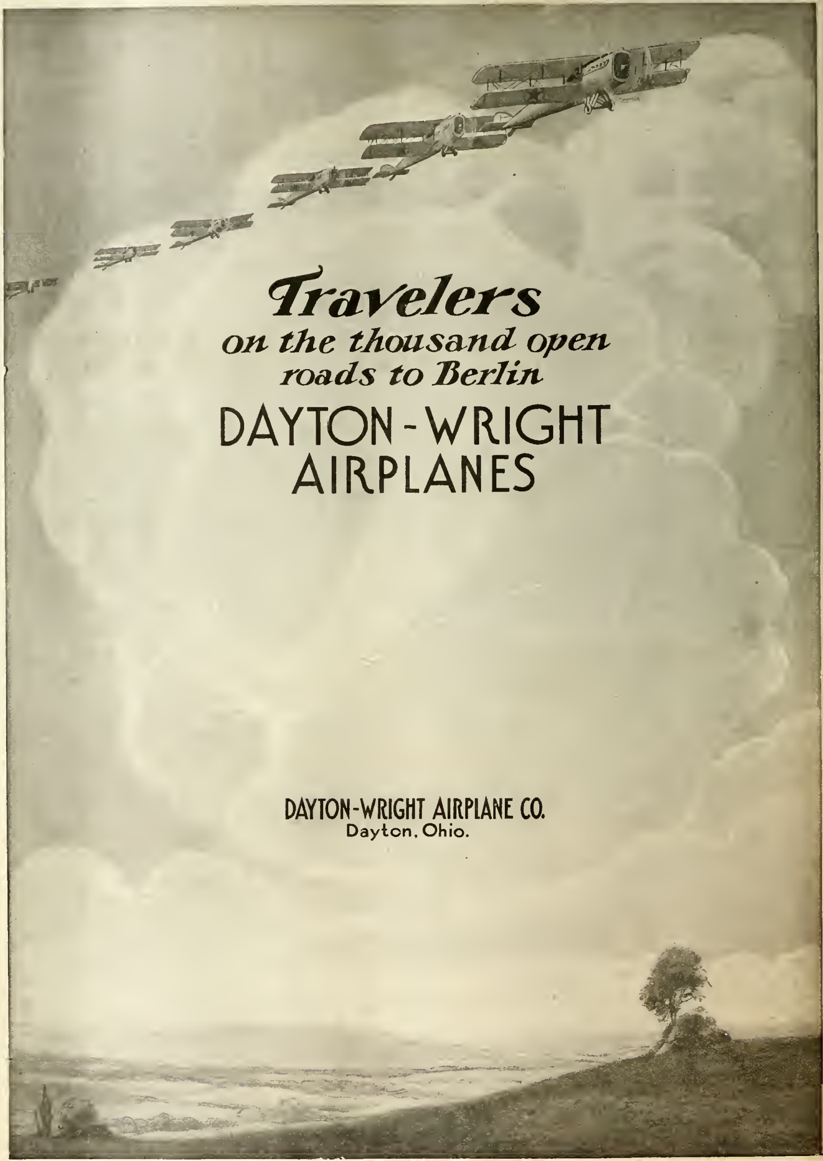

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on the thousand open
roads to Berlin

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VOL. VII NEW YORK, SEPTEMBER 2, 1918 NO. 25

SECOND ASSISTANT SECRETARY OF WAR, JOHN D. RYAN, GIVEN FULL CHARGE OVER ALL AIRCRAFT WORK

ON August 27, Secretary of War Baker announced the appointment of John D. Ryan as Second Assistant Secretary of War to have full charge of all aircraft work.

The text of Secretary Baker's announcement was as follows:

With the concurrence of the President, I have today selected John D. Ryan to act as Second Assistant Secretary of War in the place of Edward R. Stettinius, who is now in France. Mr. Stettinius will continue the special representative of the War Department in France, with full power to carry out special missions with which he is charged, and will exercise as such special representative all the powers he has hertofore had.

John D. Ryan, as Second Assistant Secretary, is designated Director of Air Service and is charged with the responsibility of procuring and furnishing to the army in the field all material and personnel required for the air service, and is given supervision, control, and direction over the Bureau of Aircraft Production and the Bureau of Military Aeronautics, with full power completely to co-ordinate their activities and to develop and carry out the air program. Mr. Ryan will select a new head for the Bureau of Aircraft Production.

Benedict C. Crowell, First Assistant Secretary of War, is specially intrusted with the responsibility for the munitions program, and as Director of Munitions is given the necessary power to see that the munitions required for our military operations are procured and furnished to the army in the field.

Mr. Keppel retains the duties heretofore assigned him.

The new relation assumed by Mr. Stettinius is in pursuance of a plan fully discussed with him before he went to Europe and with which he is in full accord.

AIRCRAFT PRODUCTION IN THE UNITED STATES

Complete Report of Subcommittee on Military Affairs

Mr. THOMAS, from the subcommittee, submitted the following report to the Committee on Military Affairs:

The subcommittee on Military Affairs, who were directed by the chairman of the committee, pursuant to a Senate resolution adopted April 30, 1917, to investigate aircraft production in the United States, have completed the duty assigned and report as follows:

TO THE SENATE COMMITTEE ON MILITARY AFFAIRS:

On April 6, 1917, the United States entered the war.

On June 8, 1917, public announcement was made that a great fleet of 25,000 aeroplanes was about to be created, and would be decisive of the war months before an effective army could be put in Europe.

July 24, 1917, Congress appropriated $640,000,000 to carry out the aircraft program. This fund has been, either by actual expenditure or by commitments, exhausted. A further appropriation of $884,304,758 has been found necessary.

In the opinion of the committee a substantial part of the first appropriation was practically wasted.

While much good work has been accomplished, for which due credit should be given, it must nevertheless be admitted that our aeroplane program has, up to the present, presented many aspects of failure. To some of these we call attention:

While an army of three and one-half million has been raised, the aircraft situation is as follows:

(*a*) Six hundred and one De Haviland 4's have been embarked for France up to August 1, 1918.

Of these, 67 had reached the front by July 1.

On August 7 a squadron of 18 De Haviland 4's flew over the German lines. Details of its performance have not been received.

The character and construction of the De Haviland 4 is further discussed in paragraph (*i*) and in the body of this report.

(*b*) We have not a single American-made Chasse (or plane of attack) upon the battle front.

(*c*) We have not a single American-made heavy bombing plane upon the battle front.

(*d*) We have not developed and put in quantity production a successful Chasse, or fighting plane.

(*e*) Our attempt to create a fighting plane was centered in an attempt to adapt the Bristol Fighter and De Haviland to the Liberty motor. The Bristol was, without sufficient tests, put in quantity production, over $6,500,000 expended, and the lives of several gallant men sacrificed, when the machine was condemned and its manufacture discontinued.

(*f*) The Standard J training machine was equipped with the Hall-Scott engine and put in quantity production. After more than 1,200 had been manufactured at a cost of $6,000,000, the machine thus equipped was condemned as dangerous and placed in storage.

(*g*) The Spad is a Chasse or fighting plane of the highest type. Early in September an oral order was given to the Curtiss Aircraft Co. for the manufacture of 3,000 of these machines. Work was at once begun and drawings practically completed.

On September 27, 1917, Col. Clark and Maj. Vincent (one of the inventors of the Liberty motor), concluded that the machine could not be operated with a Liberty motor.

October 8 the contract was canceled, the reason given being that the single-seat fighter was regarded as obsolete. But the fact is that on April 23, 1918, a contract was let to the Curtiss Co. to build 1,000 single-seat fighters, known as the S. E. 5, which is the English equivalent of the French Spad.

In addition to this, our Government is now using upon the battle front every Spad machine it can secure from the French, but has only been able to obtain about 418 of them.

(*i*) The cancellation of the Spad contract and the failure of the Bristol left us without either a single or a two seat fighter. Except the De Haviland 4, which was originally designed as a two-seat fighter and which we are equipping for reconnaissance, photographic, bombing, and fighting purposes.

Contracts for 8,500 were let at various times. Up to August 1, 1,000 had been delivered, and a number forwarded to Gen. Pershing. An inspection and test developed numerous mistakes, both in design and workmanship. Work upon the planes was stopped until the defects could be remedied. In part this appears to have been accomplished in the field, for a squadron of 18 planes has been sent across the German lines.

(*k*) As early as the month of October, 1917, we were in possession of the necessary facilities to construct the Caproni, a powerful and successful heavy bombing plane, approved both by Italian and English aeronautical engineers.

Expert Italian engineers have been upon the ground since the month of January, yet the fact remains that we have up to date constructed only one experimental machine which is equipped with Liberty motors.

Nearly a year has elapsed since we might have begun work upon these machines and by this time have been in quantity production.

(*l*) The Handley Page heavy bombing machine furnishes another example of delay. Plans were furnished the Signal Corps in the summer of 1917, but were not then availed of. Contracts for spare parts were not made until February, 1918. Deliveries of these spare parts did not begin until August, 1918. A sample plane ordered in March, 1918, was flown last July. Tests are not yet complete.

In the opinion of the committee the disappointing results above set forth are chiefly due to three causes:

1. That the aeroplane program was largely placed in the control of great automobile and other manufacturers, who were ignorant of aeronautical problems.

II. These manufacturers undertook the impossible task of creating a motor which could be adapted to all classes of flying craft. It is not too much to say that our airplane program has been largely subordinated to the Liberty motor.

III. We failed at the beginning of the war to adopt the commonsense course of reproducing the most approved types of European machines in as great numbers as possible. This should have been carried on coincident with the production of the Liberty motor. This sound policy has very recently, but after a lamentable lapse of time, been adopted.

The mistakes and errors referred to would probably have been largely avoided if the aircraft program had been under the control of one man, assisted by skilled aeronautical engineers and practical flyers to design and test our machines, with production made subordinate to them.

This brief summary is not a wholesale condemnation of our aircraft program. Much has been accomplished. The committee is glad to report that while it believes there are yet many things to be remedied, nevertheless we are approaching a period when quantity production of planes may soon be hoped for.

The committee further reports in detail:

Beginning on May 29, your committee, instructed to inquire into the causes of delay in aircraft production, visited a number of training and testing fields and manufacturing plants in different sections of the country. It has since examined many witnesses, comprising manufacturers, fliers, officers, inspectors, and men more or less familiar with the subject and interested in the solution of its problems. The committee has not exhausted all sources of information, to do which would require the remainder of the session, but it received statements and heard testimony upon many features of the question. No attempt has been made to investigate charges of personal dishonesty or official corruption. That subject more properly belongs to the Department of Justice, which, under the direction of Hon. Charles E. Hughes, has been conducting an inquiry of its own regarding that and other phases of the subject.

In directing attention to conditions, both past and present, in the aircraft administration, your committee realizes that it is easier to criticize than to construct, and that due allowance should be made for mistakes of judgment, which are unavoidable in the organization of a new branch of the service, involving the establishment of an extensive industry. Our inquiry has been as impersonal as these conditions have permitted, and it is in the same spirit that this report is made.

The Aircraft Board

As originally composed, representatives of the automobile industry featured this organization, presumably due to the theory that aircraft engine and plane production were analogous pursuits. The latter was therefore submitted to the custody of men skilled in automobile production. A board thus equipped naturally depended upon motor-car engineers and manufacturers for the solution of aviation problems. But the analogy between the two pursuits virtually begins and ends with the fact that each uses a gas-explosive motor. Hence difficulties in design and production would tend to increase until such conditions were recognized. This fact must have been demonstrated to the board through its initial experiences, for Maj. Downey states that in the beginning the board wanted much authority with little responsibility.

"They wanted the Signal Corps to execute contracts and stand back of them, the board to be in an advisory capacity, and still control the situation."

Later, when—"They saw the crash coming the board passed a resolution reaffirming the fact that they were only acting in an advisory capacity."

Organization under the Aircraft Board was unsystematic and ineffective. The chief officer of the Signal Corps was the nominal head, under whose ostensible supervision bureaus of engineering, equipment, supplies, lubrication, production, etc., were established, many of whose functions ill defined, conflicted with, or overlapped each other. Contractors, inventors, material men, everyone having business with this arm of the service and directed from one official to the other could not well transact their business and secure results with directness and efficiency. While this condition seems to be inseparable from official business routine in Washington, it featured largely in aviation from the start, materially hindering production on the one hand and diffusing responsibility therefor upon the other. Fairness, however, requires the statement that the identification by Congress of aircraft production and administration with the Signal Corps was unfortunate. The primary needs and importance of that corps as then defined were fully equal to the experience and efficiency of its commanding officer.

Aircraft Program

When Italy entered the war she made a careful study of aerial warfare upon the French front as then developed. Her engineers then selected the most efficient types of French flying planes and immediately put them into production under the supervision of skilled French artificers. Coincident with this policy she began the development of airplanes on her own account. Her armies were, therefore, rapidly equipped with an excellent service, afterwards supplemented by machines equally effective, but of Italian design and driven by Italian motors. By this means she avoided delay in production. She also promoted the development of her engineering genius by employing it under practical conditions upon the front with the best machines that France had produced.

Your committee does not understand why the Aircraft Board did not adopt this obviously essential policy. The Signal Corps dispatched a commission to the front, headed by Col. Bolling, instructed to secure all needed information, evidently for that purpose. Col. V. E. Clarke, the aeronautical engineer of the commission, made an elaborate report, having Col. Bolling's approval, recommending the production of three English, two French, and one Italian plane, but the report was not heeded. Designs for these and other types were placed by the allied Governments, or by the inventors themselves, at the board's disposal, with assurances of expert aid to their vigorous construction.

An ostensible reason assigned for the board's inaction was the difficulty of translating metrical into linear measurements, and of obtaining quantity production of foreign motors. But the tardy acceptance and manufacture of some of the models and designs revealed the imaginary character of this objection. The board took some of the planes placed at its disposal and attempted with ill success to materially change them for American production. The general purpose of the changes seems to have been designed to adapt them to the Liberty motor, but this normal action should have been paralleled by their manufacture, both as to plane and engine, in strict accord with the plans as submitted.

Ultimately, and in the autumn of 1917, the board adopted one French and two English types of fighting planes to carry the Liberty engine. These were the Spad, the Bristol, and the De Haviland 4. Col. Clarke was instructed to redesign the Bristol upon the English model, retaining its wing load of about 7.1 pounds in a total weight of 2,937 pounds.

Hundreds of changes afterwards made in this design by Signal Corps and production engineers without consulting Col. Clarke increased the wing load to about 9.2 pounds per foot, with an approximate weight of 3,700 pounds. Some of these changes were required by the increased strain of the heavier and stronger motor upon the structure. The machine was finally put into production and then abandoned after the test of July last, and after an expenditure of more than $6,500,000 and the loss of several valuable lives.

The overload placed too great a strain upon the wings, and this, with bad construction, compelled the board to stop production. The money loss may be partly covered by salvage. The loss of life and of months of precious time through the needs of substituting another type of plane for the Bristol and then producing it are matters of serious concern.

In September, 1917, the Signal Corps contracted with the Curtiss Co. for 3,000 one-seater Spad planes. This is an excellent French biplane, then and now in use on the front. In October the contract was canceled, the reason given therefor being that it was done at the direction of Gen. Pershing. Inasmuch, however, as Gen. Pershing's cablegram concerning the subject bears the date of December 14 following, we must accept the statement of the Curtiss Co.'s officials that the board canceled the contract because it desired to equip the plane only with the Liberty eight-cylinder motor, which was found impracticable. The Liberty 8 was about that time discarded.

The plane was too light for the Liberty engine, so its production was suspended. The French use the Hispano-Suiza motor with this plane, and the Curtiss people assure us that their contract would long ago have been completed and the planes in the service at the front had the manufacturers been permitted to proceed with production. No attempt was thereafter made to manufacure single-seater fighters, ostensibly because of the Pershing cablegram, until May last, when Mr. Ryan placed an order with the same company for 1,000 SE5 planes. This is substantially the English equivalent of the Spad and will probably be in production during the coming autumn. It is manifest that if the manufacture of the SE5 is proper at this time, then the discontinuance of the manufacture of the Spad was a mistake, regardless of who is responsible therefor

The plans for the Caproni and the Handley Page bombing machines were available to the board soon after our entry into the war.

Early in the summer of 1917 the Standard Aircraft Co. was instructed to hold their plant at Elizabeth, N. J., in readiness to build Caproni planes.

About September 15, a verbal contract was made with the Curtiss Co., formally confirmed on October 8, 1917, to build 500 Caproni planes. This contract was never carried out, because no information was furnishes to the Curtiss Co., although they repeatedly endeavored to secure the same. Afterwards it was canceled, and contract for the Bristol Fighter was substituted.

(*Continued on page* 1235)

The News of the Week

U. S. Fliers Downed 76 Planes to Aug. 1

Statistics covering the activities of the first American pursuit group of aviators up to August 1, comprising only four of the American squadrons now in operation, show in a striking way the strides made by American aviators since the United States entered the war.

The figures show that no fewer than fifty-eight aviators are officially credited with downing anywhere from one to five planes. Seventeen machines are credited to the late Raoul Lufbery.

In actual numbers the German machines downed total fifty-nine, exclusive of those of of Lufbery, but they are divided officially among nearly twice that number of men, because on numerous occasions several fliers participated in a battle.

The aviators with five victories each are Lieuts. Campbell, Rickenbacher, MacArthur and O'Neill. Those with four each are Capt. Peterson and Lieut. Meissner. Those with three each are Lieuts. Mitchel, O. P. Porter, Simonds, Jones and Healy.

Fourteen others have two victories each, and thirty-two more, including the late Lieut. Quentin Roosevelt, are credited with one each.

These figures do not include the records of other squadrons, which have been even more successful.

American Airmen to be Given More Instruction In Gunnery

The War Department authorizes the following:

For the extension if instruction in gunnery and in order that more fliers may be trained on this side ot the Atlantic, the Division of Military Aeronautics, on approval of the Secretary of War, is now leasing land for target practice near the larger flying fields. A tract of 10,000 acres has just been leased outside of Fort Worth, Tex., and not far from Taliaferro, Barron, and Carruthers Fields.

Within a few miles of Hazelhurst Field, Mineola, Long Island, and fronting on the south shore, another tract of 750 acres has been leased at Wantagh, known as Lufbery Field, and additional marshy land is being secured. A piece of 50½ acres, adjoining Mineola Field, and formerly occupied by hucksters' stands and shanties, has been leased and has been leveled for a drill and exercise ground.

Balloon Observers Needed

The Division of Military Aeronautics is in need of several hundred young men between the ages of twenty-five and thirty-five years for duty as balloon observers. The candidate should have a technical training that will help him to read maps and photographs of the terrain and to calculate distances and angles. The Division of Aeronautics sends the successful applicants to one of its training schools, of which it has five—at Arcadia, Cal.; Fort Omaha, Nebr.; John A. Wise, San Antonio; Lee Hall, Va., and Fort Sill, Okla., the last two being the schools where the candidates get practice in connection with the Artillery camps in those places. The candidates, upon completion of their course, receive commission as second lieutenants, and are sent abroad for further education.

Air Hero of Italy in U. S.

An Atlantic Port.—A French steamship arriving at this port on August 22 brought many notable military and civil officials among its 210 passengers. On of the passenger list was Lieut. Parvis, Italy's foremost air fighter.

Lieutenant Parvis, Italy's air hero, comes to the United States to carry on the work begun by the late Capt. Resnati, who was killed in a fall on Long Island early in the summer. On an Italian steamiship Lieut. Parvis is bringing a Caproni triplane, in which he expects to install three Liberty motors to demonstrate the effectiveness of the American air engine in heavy bombing planes.

Lieut. Blair Thaw is Killed by Fall

With the American Army in France.—Lieut. Blair Thaw of Pittsburg, a member of the American aviation service, was killed on August 18.

His aeroplane fell as a result of engine trouble.

Lieut. Thaw was travelling in a pursuit group near the front toward Paris. The engine trouble developed at an altitude of 2,000 feet, and the machine, when it fell, struck a number of telephone wires and collapsed, upside down. Thaw was instantly killed and his companion aviator was badly injured.

Thaw, although less well known than his brother, had just been promoted to command a flying squadron and was on his way to take over the squadron when he fell to his death. His body was taken to an evacuation hospital, where impressive funeral services were held.

Lieut.-Col. Harry W. Gregg, the officer in charge of the Aviation Concentration Camp at Garden City, Long Island

Safeguard Cologne Museum Collections

Washington. — An official dispatch from Switzerland says that the art collections in the museums at Cologne are to be taken to Cassel and Brunswick to be out of danger from Allied aerial bombardments. The German newspapers are asking that the treasures in the Munich museums be similarly safeguarded.

Official War Photographs

A catalogue of the official war pictures collected by the picture division of the Committee on Public Information has just been issued and is ready for distribution to the public. The "official" pictures listed in the catalogue include photographs taken by the Signal Corps of the Army, the Navy, Marine Corps, and other branches of the American service, and also photographs taken by the French and Belgian Governments. Photographic prints of the pictures on heavy paper and ready for framing or insertion in albums are now on sale at 10 cents each. Stereopticon slides of finest workmanship, standard size, and suitable for the use of teachers and lecturers, are for sale by the committee at 15 cents each.

For further information in regard to these photographs address the Division of Pictures, Committee on Public Information, 10 Jackson Place, Washington, D. C.

New Fast Aeroplane Sent Out by Enemy

Paris, August 18.—French aviation circles report the appearance of the western front of a new German chasing aeroplane, the Siemens-Schuckert biplane.

This machine has an eleven cylinder engine of the same name, which developes 260 horse power and drives a four-bladed propeller. The plane carries two machine guns, which are simultaneously or separately through the propeller. It is extremely rapid and easily handled.

Calls 253 for Air Service

Washington.—Provost Marshal General Crowder issued a call on August 17 for 253 men for limited service in the military aeronautic division of the army. These men will mobilize at Madison Barracks, Sacketts Harbor, N. Y., on August 29, from eighteen States, as follows:

Connecticut, 10; Delaware, 3; Georgia, 5; Illinois, 25; Indiana, 15; Maine, 5; Maryland, 5; Massachusetts, 20; Michigan, 20; Minnesota, 10; Missouri, 10; New Hampshire, 5; New Jersey, 20; New York, 40; Ohio, 25; Pennsylvania, 25; Rhode Island, 5, and West Virginia, 5.

Planes for Museums

Melbourne.—The Australian Government has planned the establishment of war museums in Australia after the war for the exhibition of trophies and relics. Among these are to figure enemy aeroplanes which are captured without being totally destroyed by the Australian flying corps.

Such wrecked machines are, of course, thoroughly inspected by the technical department of the Royal Air Force for examination of German devices and German adaptation of British devices. They are eventually handed over to the Australian Government, to take their place along with other trophies won by the Australian forces.

U. S. Flyers Join in Raid

London.—American naval flyers participated in the air raid August 15, when Allied aviators bombed Ostend. Further activities against submarine bases along the Flanders coast are expected. The night bombing expedition was regarded as particularly successful.

Several seaplanes, equipped with Liberty motors, have been with the American fleet for months. The bombing type of plane, which carries eight machine guns, has proved satisfactory in all tests, it was said in British naval circles.

Commend U. S. Flyer

A special report from the commander of a British aero squadron in which Lieut. Edmund G. Chamberlain of San Antonio, Tex., is commended for excellent service in bombing raids, has been received by the Navy Department. The communication shows that the naval flyer took part in fifteen air raids from June 20 to July 13.

Lieut. Chamberlain is mentioned in the British report as having participated in the attacks on Zeebrugge harbor and canal and the Bruges docks.

Air Mail to Athens

Paris.—An air mail service between Athens and Saloniki will be inaugurated this week. The "air post" will give a daily service between the two cities and at a cost of only 6 cents a letter.

Aero Office Needs Typists

Stenographers and typists are needed for the office of the Director of Military Aeronautics in Washington, and there is an immediate chance to get into this most interesting branch of the military service. Capt. D. B. Lawrence of the Aviation Service is on duty at the office of the Air Service Officer, 104 Broad street, where applicants will be interviewed at any time. Stenographers and typists in the Air Service are paid at the rate of $1,100 to start. At the end of three months this salary is automatically increased to $1,200, and there are good opportunities for advancement to higher salaried positions. Special arrangements have been made with the civil service to give prompt examination to all applicants, and those who pass the civil service test can be certified for service within a few days.

Rooming conditions in Washington are very much improved, and the Council of Defence in that city will see that every employee gets a choice of rooms. The new Government buildings for civilian employees will be ready about December 1 and will provide rooms and board for 5,000 employees at very low rates.

"Cartwheeling" is one of the simple tricks performed by military fliers. The pilot stands the machine on its tail, and by certain movements of controls makes it drop sideways, so that as its nose falls the craft comes out in the opposite direction to that which it was flying originally.

Noted German Fliers Killed

Washington.—Thirteen of Germany's leading aviators have been listed as missing in action since July 1, according to an official despatch from France, received here on August 17. The aviators who have been thus listed and the number of Allied machines with which they were credited with bringing down are: Leo Wernbardt, fifty-three; Mensbkoff, thirty-nine; Bongartz and Buckler, thirty-three each; Billik, thirty-one; Wuesthoff, twenty-six; Von Turcheck, twenty-seven; Kirchsteiner, twenty-seven; Puetter, twenty-five; Winisch, Fredericks and Pipphardt, twenty-one each, and Richardt, twenty.

The German high command, while sparing of planes, the despatch says, has been most prodigal in the exposure of pilots.

German Aviators Using Parachutes

British Headquarters in France.—It is said that some German airmen are now using aeroplane parachutes with apparent success. On August 14 a Fokker biplane was seen to emit smoke while at a great height, burst into flames and dive. A parachute was noticed to open suddenly in the considerable wind pressure caused by the dive, and drag the pilot clear of the machine. Another Fokker brought down the same day was similarly fitted.

Our Airmen Win Fight

With the American Forces in France.—Two bombing flights were carried out on August 19 by American aviators on the towns of Longuyon and Audun-le-Roman, northeast of Verdun. Bombs were successfully dropped on railroad tracks and roundhouses.

Three American reconnoissance planes encountered and attacked three German machines near Wavrille, to the north of Verdun. One German aeroplane was forced down with its tank on fire and the others were driven away. The Americans returned to their bases safely.

Another reconnoissance formation met six Rumpler monoplanes near Tbiancourt. Three of the German aeroplanes attacked Lieut. Urband, who was taking photographs. The Lieutenant opened fire and hit one German machine, which spiraled sharply downward and disappeared at 11,000 feet.

Son's Record is Sent to Roosevelt

Col. Theodore Roosevelt has received a letter from Gen. Pershing, in which he said:

"Quentin died as he had lived and served—nobly and unselfishly—in the full strength and vigor of his youth, fighting the enemy in clean combat. You may well be proud of your gift to the Nation in his supreme sacrifice.

"Inclosed is a copy of his official record in the air service. The brevity and curtness of the official words paint clearly the picture of his service, which was an honor to all of us."

The record says Lieut. Roosevelt entered the service August 8, 1917, and then gives his assignments up to the time of his death, July 17, 1918. Continuing it reads:

"Lieut. Quentin Roosevelt, during his whole career in the air service, both as a cadet and as a flying officer, was a model of the best type of young American manhood. He was most courteous in his conduct, clean in his private life and devoted in his duty.

"After completion of his training as a pilot, he was selected on account of his efficiency as an instructor and had charge of one of the most important flying instruction fields. His great desire and hope was to get to the front. This opportunity was not practicable for a comparatively long time on account of his expert services being more needed as an instructor.

"When the order assigning him to duty with a squadron finally came on June 24, he lost no time in reporting and arrived just in time to take part in the last great enemy offensive where the combat work by his squadron was most strenuous and aided materially in the success of the battle.

"Lieut. Roosevelt had already brought down one enemy plane and had aided the squadron in a number of flights against large enemy air formations, where the American units dispersed the enemy and brought down a number of their aircraft. His work durinng the combats was exceptionally good, his endeavor being the success of the squadron rather than to get individual aeroplanes to his personal credit.

"His loss was deeply felt by his flying comrades in the squadron, as well as by all officers and soldiers with whom he had ever come in contact."

This record was made by Col. R. O. Vanhorn of the Air Service.

Lieut. Earl Carrol—the · Composer—Aviator of the U. S. Air Service

Aeronautics in 1783

Secretary of the Aero Club of America,
New York.

Dear Sir:

I believe your society will be interested in the enclosed interesting note relative to the history of the aeroplane, which I found recently while looking over a copy of the *Maryland Gazette* for November 14, 1783, under caption "London Notes"—and take pleasure in forwarding it to you.

Sincerely yours,
H. M. Nicholson.

291 Quincy St.,
Brooklyn, August 18, 1918.

From *Maryland Gazeztte*
November 14, 1783
"LONDON NOTES"

"The French have generally been famous for invention, the English for improvement:—if, therefore, the former have invented a machine to rise into the atmosphere, the latter may be expected to frame one to mount to the planets."

Lieut. Louis Bennett, Jr., of the British Royal Air Forces

With the American Army in France

With the American Army in France.—Lieut. Henry G. Maclure of Newton, Mass., has been missing since July 15. He was operating a pursuit machine in company with others, protecting observing planes, when he became detached from his squadron and vanished.

With the American Army in France.—An American bombing squadron commanded by Lieut. Gundelach dropped twenty bombs on the railway yards at Conflans on August 15. Eighteen direct hits were observed in the centre of the tracks in the east portion of the yard and two on the roundhouse.

The squadron was pursued by eleven enemy planes, six of which were speedily left behind. One of the remaining five was hit by the American machine gunfire and forced to descend near Joinville. Lieut. Gundelach was slightly wounded.

Our aviators also successfully bombarded the railroad yard at Dommary-Baroncourt, in the Verdun-Metz area. Longuyon, north of Verdun, and Thiaucourt were also attacked.

Several bursts were observed in the central and southern parts of the yard at Dommary-Baroncourt, and the installation there are believed to have been wiped out.

Three direct hits were made on the track in front of the station at Longuyon and twenty-three bombs fell on surrounding warehouses,

During the aerial fighting an American airman attacked a German balloon. His gun jammed when he tried to fire incendiary bullets, but he was able to fire fifty of the other kind. The German aeronaut then jumped with his parachute.

Confirmation has been received of the victory of Lieut. Edgar C. Tobin of San Antonio, Tex., in the air combat on August 10.

With the American Army in France. Lieut. David E. Putnam, of Brookline, Mass., brought down his eleventh enemy machine on August 15.

Four Americans in the morning met four German "Fokkers." Lieut. Drew brought down one of them and Lieut. Stiles another.

Paris, August 16.—Lieut. Walter B. Miller of New York, a former member of the Lafayette escadrille, who was transferred to the American service, was killed in an aerial combat August 3.

His patrol, consisting of eight machines, was attached by a German squadron of thirty aeroplanes. He fell inside the American lines. The other members of the patrol escaped after a fierce struggle.

Headquarters American
Expeditionary Forces,
August 16, 1918.

Section A.—Yesterday in the course of a combat in the region of Flirey our aviators shot down a hostile machine.

The following details of this aerial combat have been reported: "Lieut. Stiles and Lieut. Drew engaged four Fokker biplanes over Fliery on August 15. One of the planes was brought down, Lieut. Stiles and Lieut. Drew being credited equally with the destruction of the machine."

Capt. Biddle Wins Air Fight

Washington.—Capt. Charles J. Biddle of Andalusia, Pa., was the American aviator who brought down a German aeroplane in the Lorraine, mentioned in Gen. Pershing's official communiqué August 17. Additional details are contained in section B of the communiqué for that day, made public today. It follows:

Section B—The following details of the aerial combat referred to in section A have been reported in Lorraine:

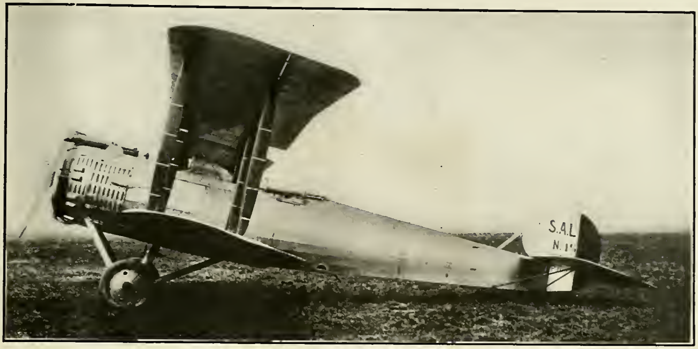
Capt. Biddle brought down a Rumpler machine northwest of Douxieres-aux-Dames at 5:40 o'clock in the afternoon of August 16. The observer was killed and the pilot wounded, but the machine landed intact.

Lieut. Vaughn H. McCormick of Columbus, Ohio, got his second official German aeroplane when he engaged the enemy in the air north of St. Mihiel on August 18. French observers have confirmed the destruction of the German.

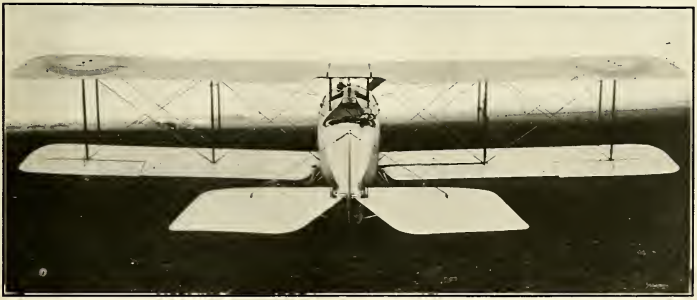
Another enemy machine was shot August 10 by Capt. Ray C. Bridgeman of Lake Forest, Ill., near Xivray, in the destruction of which Lieut. McCormick also shares officially.

Additional American victories in the air include a monoplane apparently shot down by Leut. Hermann Schulz of Bettendorf, Iowa, which went down in a steep dive through the clouds over Flirey, after 375 shots had been fired at it, and a biplane attacked by Lieut. Edgar C. Tobin of San Antonio in the vicinity of Evvezen. Confirmation is being sought for both these victories.

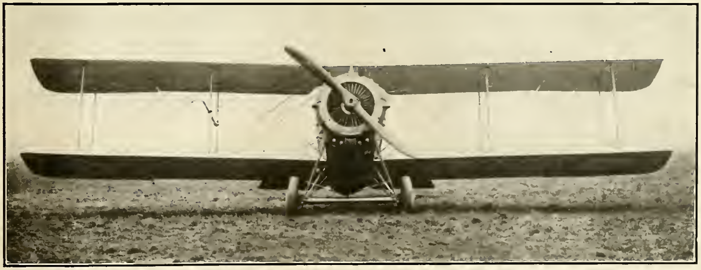
Wednesday was the most active day in the air for some time along the American battle front. One of the American planes attacked a German Rumpler machine. The German disappeared, but apparently was under control. Another American machine forced a German to "run for his life."



Side view of the Salmson biplane



A French Salmson hiplane. Two seated, it is used for artillery ohservation and contact patrol. Some of these machines are being used hy the Americans in France at the present time



A Salmson hiplane equipped with a 250 H.P. Salmson stationary radial motor

In Recognition of Loyal Service

In conformity with a recommendation of the War Department that faithful service of employees engaged in the manufacture of war materials should be recognized, the American Bronze Corporation, of Berwyn, Pennsylvania, is one of the first concerns in that district to adopt the proposed policy.

Beginning twelve years ago as a modest $5,000 concern, this company has enjoyed a remarkable growth and is now devoting nearly all its output to war purposes. By the American Bronze Corporation's plan of war work recognition each employee is awarded a bronze war worker's badge which, at the expiration of thirty days, will be exchanged for a silver badge, provided the employee has rendered faithful and loyal service. After wearing the silver badge for one month each employee will receive a cash bonus, which will continue for a period of six months, after which he is awarded a gold badge with his name engraved thereon. The gold badge entitled its wearer to the cash bonus during the entire period of his employment, provided he qualifies under the regulations.

The presentation of these badges was made a feature of a "house-warming" held on August 16, in celebration of the opening of the American Bronze Corporation's new plant at Berwyn. The new structure more than triples the former capacity of this rapidly growing concern, and is of the most modern construction and equipment throughout, including a carefully worked out system of routing the work through the plant to insure a maximum of output within a minimum of time.

The exercises began in the afternoon, when the new plant was formally turned over by the contractors and accepted by Mr. M. C. Dittman on behalf of the company, following which Mr. E. G. Anderson gave a talk on the important part their product is taking in the carrying on of the war. Mr. Dittman then explained the bonus plan, after which different department heads were called on for short talks, concluding with an address by Mr. G. D. Porter, representing the stockholders. An election of department representatives closed the afternoon exercises.

The evening festivities began with the playing of the Star Spangled Banner by a band, the selection resolving itself into an accompaniment to the singing of the anthem by the entire gathering. This was followed by a program of vocal and instrumental music, during which Captain Schwab made a short address and distributed the badges. The evening program was given as a "get together" party for the employees and their friends and concluded with dancing and a lavish outlay of refreshments.

Officers of the American Bronze Corporation are John W. Watson, President and General Manager; Matthew C. Dittman, Vice-president and Treasurer; Richard A. Watson, Secretary and Production Manager.

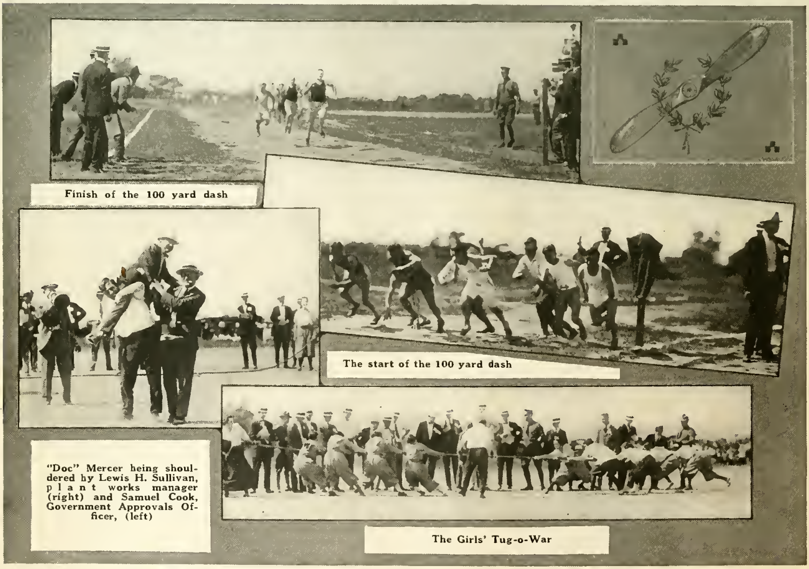
Hall-Scott Supplies Allies

Orders for supplying one of the Allied governments with a number of Hall-Scott L-6a six cylinedr aeroplane engines are being executed by the Hall-Scott Motor Car Company at the West Berkeley, California, plant. This is an improvement over the earlier six cylinder types put out by this company. It is understood the motors are to be used in training planes for advanced students. The rated horsepower is 200 and 1,700 r.p.m. Government testing cards and reports indicate this L-6a type to be of a most advanced type of six cylinder aeroplane engine, and it was largely on the exceptional showing made under government observation that this order was placed. Shipment will be made in the course of a few weeks.

Telepost Explained to Inventors Meet

The mechanism of the Telepost system of automatic rapid telegraphy, invented by Patrick B. Delany, of South Orange, N. J., was explained by H. Lee Sellers, of New York, president of the Telepost Company, to the members of the American Inventors' Association at the Board of Trade rooms.

This remarkable invention has been used in commercial operation between Chicago and St. Louis for over three years. It has a speed of 1,000 words a minute, three times faster than the most rapid speaker, and will work over a telephone circuit with no interference with conversations over the line.



Finish of the 100 yard dash

The start of the 100 yard dash

"Doc" Mercer being shouldered by Lewis H. Sullivan, plant works manager (right) and Samuel Cook, Government Approvals Officer, (left)

The Girls' Tug-o-War

Photographs taken at the Field Day and Athletic Meet of the Standard Aircraft Corporation at Elizabeth, N. J., on August third. The prizes were donated by the executives of the company

MILITARY AEROSTATICS

By LIEUT. H. K. BLACK, R.F.C., C.F.A.

THE subject of parachute harnesses is one which has been probably as widely discussed among balloonists as any subject relating to the balloon service. Notwithstanding this discussion, there has been no definite agreement reached. There was a type of parachute harness which was regarded as standard and issued as such by the Royal Air Force. This harness, however, did not meet with the unqualified approval of the balloonists in France, so they evolved their own harnesses, which they used in actual practice. They had them made under local arrangements in France.

While a discussion in this column as to whether or not there should be a standardized harness is distinctly out of place, there is this to be said. The balloonist who is making flights every day and who is closest in touch with the practical end of parachute jumping under service conditions, ought, I think, to be consulted as to the harness he shall wear. I do not mean in training, but while he is working in France in the presence of the enemy.

The officer who has accumulated more or less experience in actual balloon work in France will feel much more confident in the efficiency of his harness, if it happens to be one in which he believes. If he does not like a harness, it is dollars to doughnuts that he cannot do his best work while wearing that harness. Therefore, if he likes another harness better, he should be allowed to wear it, if it conforms to the known laws of safety. That is why the British balloonists were provided with a good harness, but were allowed to wear another kind if they liked it better.

To inspire confidence is the first requisite of a harness; that is, providing it is efficient. Whether it is efficient or not can generally be left to the balloonist who is going to use it. The next requisite of a harness is comfort. A pilot or observer spends long hours in the basket of an observation balloon. His harness must be comfortable to enable him to be most efficient. Lightness is a necessary factor in this. A harness which is heavy is going to drag heavily on the shoulders of its wearer. The simpler a harness is, consistent with safety, the better. A complicated harness continually catches on things in the basket, gets in the observer's way at most inopportune times, sometimes reduces him to a state of speechless rage, whereby he is apt to be very impolite to his ground officer and also to his batteries, and a case has been known where an observer was so hampered with his harness that, to be free from its entanglements, he unhooked it, and when it became necessary to parachute he jumped overboard without it, forgetting in the excitement of the moment that he had unhooked it.

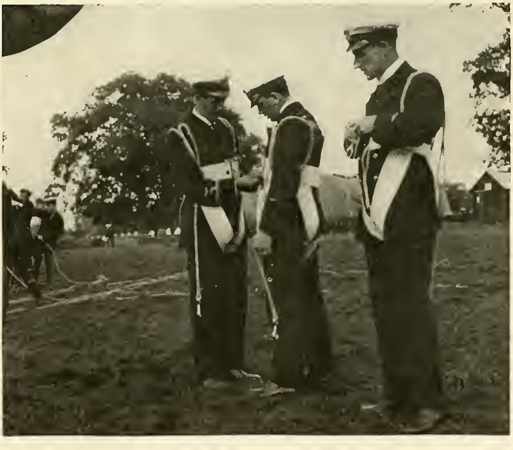
The reference to impoliteness given above may seem a frivolous remark to the average reader. Believe me, it means a good deal more than appears on the surface. The balloons had a very hard time to overcome a whole lot of mistaken prejudice on the part of the artillery against them. A close liason with the artillery is absolutely essential to the best co-operation between the two arms. Poor telephone connections have ruined some very desirable business and social connections even in civil life. The telephones in the army are never as good as might be desired and sometimes cause an even tempered person to exhibit some quite futile temper. Add to a temper somewhat frayed by the difficulties of telephone conversation from a balloon basket, an additional rage caused by a parachute harness getting in the way, and one has all that is necessary to cause a rupture between the artillery and the balloon service. After all, the artillery officers are only human and they think a lot of their arm of the service. I know because I was one of them at one time.

A simple harness has the added advantage that it can be cleared very quickly when occasion demands. When parachuting, an observer has very little time to make up his mind about things. A glance must tell him that his parachute is clear before he goes over the edge. Another desirable point in a harness is that it can be quickly attached and detached from the parachute; sometimes it is just as necessary to get loose from a parachute as it is to be tied to it. In either case the fastening must be absolutely sure.

All harnesses partake, more or less, of the nature of a breeches buoy. Some have bands which fasten tightly just above the knees. This type are apt to restrict the circulation owing to the tightness, and that is not the most pleasant thing in cold weather. On the other hand, if these bands are not fairly tight, in jumping they are apt to be pulled down to the knees and then they suspend the parachutist by the knees, making a decent landing an impossibility. I have seen a type which was very simple, so simple, in fact, that it looked dangerous. However, I have seen it used successfully on more than one occasion in France. It consisted of two loops made in a rope with a small pad on which the observer sat. Fastened to where these two loops joined, and crossing the back of the observer, was a single rope which joined the main suspension over his shoulder.

The majority of harnesses are made of heavy canvas which laces on something the same as a corset. This has two loops of canvas which the legs go through. Light ropes spliced into the top of the canvas suspend the observer from the parachute.

(To be continued)



British Royal Naval Air Service balloonists lacing themselves into their parachute harnesses at one of the Naval training stations. The harness is made of canvas. The harness shown herewith is one which was in common use in 1917. It is a fairly comfortable harness. It laces about the chest and fastens under the shoulder strap of the tunic. The suspension is from the shoulders. Toward the end of 1917 the snaffle hook, which is seen hanging at the end of the suspension ropes, was done away with. The connection with the parachute was then made by a double sheet bend

THE 240 H. P. 8 CYLINDER MERCEDES

Bore 140 m. m.—Stroke 160 m. m.

The following detailed report on the design of the 8-cylinder Mercedes engine is based on an investigation of the engine (No. 23,003) taken from the German two-seater Albatros Biplane (G. 37) which was brought down by anti-aircraft guns near Armentieres on the 12th of May, 1917.

This engine has been tested at the Royal Aircraft Factory and results of B.H.P. developed, petrol and oil consumption, etc., during tests are given herewith, together with details of the engine design and the leading particulars of the engine. Althought this engine, according to reports, is now obsolete, the design having been abandoned in favor of the German standard six-cylinder vertical type, details and illustrations of the engine will no doubt prove of considerable interest, more particularly to those interested in the design of the special engined used for airship work.

In its general details this engine follows closely the design of the 160 H. P. Mercedes engines as regards the construction of the cylinders, pistons, valve gear, etc., and also in the lubrication system. It is therefore very similar to the 160 H.P. engine, with an extra pair of standard cylinders and a massive propeller shaft reduction gear, and the necessary alterations to the design of the crankshaft and the induction system, and in consequence of this similarity in detail to the 160 H.P. Mercedes; it will be unnecessary to deal at any length in this report with the design of those parts of the engine which are identical, a report on the former having already been issued, and the design being now well known in this country.

During calibration tests at the Royal Aircraft Factory, the engine showed a very good general performance, developing a maximum of 286 B.H.P. at 1,750 r.p.m. and an average of 242 B.H.P. at a normal crankshaft speed of 1,350 r.p.m.

Summary of Test

Average petrol consumption per hour........	141.3 pints.
Average petrol consumption per B.H.P. hour.	582 pints
Average oil consumption	.042 pints/B.H.P. hour.
Oil temperature	37½°C.
Max. B.M.E.P. at 1,100 r.p.m.	120 lbs./sq. in.
Average B.M.E.P. at 1,350 r.p.m.	118 lbs./sq. in.
Compression ratio......	4.73 :1

Water pump at normal engine revs. against a pressure of 2 lbs. per sq. in. = 91 gals./min.

The total weight of complete engine, dry including propeller hub and exhaust manifold = 900 lbs., equivalent to 3.72 lbs. per B.H.P.

An attempt was made to throttle the engine below 900 r.p.m., but the running was irregular.

During a power and consumption run of 1 hour's duration an average of 267 B.H.P. was developed, at an average speed of 1,550 r.p.m., and at an average petrol consumption at 155 pints per hour = .582 pints per H.B.P. hour.

Oil consumption = 10.10 pints per hour = .42 pints per B.H.P. hour.

Water temperature, inlet = 65°C; outlet = 78°C.

This test should not, however, be taken as representing the normal performance of the engine, as the average speed at which it was run, namely 1,550 r.p.m. is higher than that which would be obtained for any length of time in the air.

Details of Construction

Cylinders.—These, as already stated, are of the standard 160 H.P. type, and are made entirely of steel, being built up of the top half of the crankchamber, and acting as the loading down bolts for the cylinders.

Following the usual Mercédes practice the crank webs are made slightly heavier in cross section towards the front end of the crankshaft. The external diameter of the crank pins is 55.9 m.m., and the length of the crank pins 70 mm.

The decreasing internal diameters of the hollow crank pins and journals follows the standard Mercédes practice, the holes bored in the rear end crank pins and journals being 40 mm., whereas the internal diameters of the crank pins and journals are gradually reduced throughout the length of the crankshaft to 22 mm. at the front end.

The thrust ball race at the front end of the crankshaft is situated directly behind the reduction gear pinion, and is held in position in the two halves of the crankchamber housing, the thrust race being located by a double flanged ring, and also

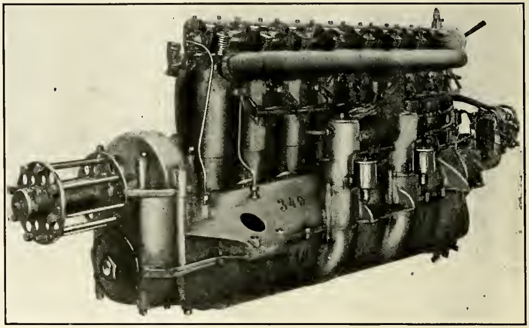
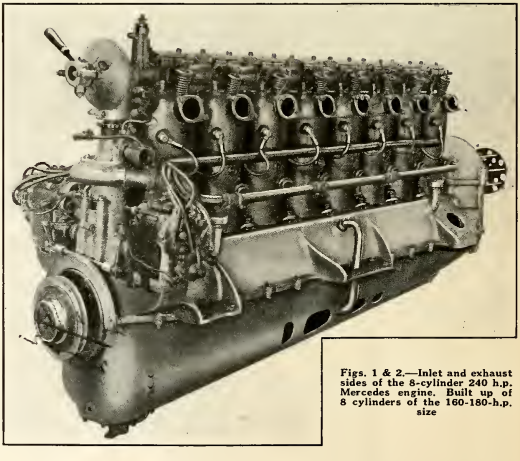
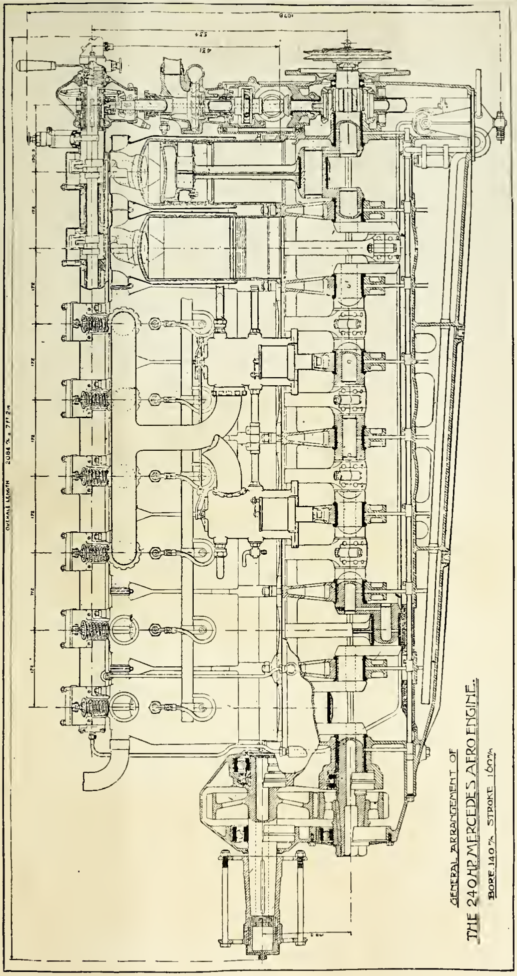


Figure 1



Figs. 1 & 2.—Inlet and exhaust sides of the 8-cylinder 240 h.p. Mercedes engine. Built up of 8 cylinders of the 160-180-h.p. size


GENERAL ARRANGEMENT OF
THE 240 HP. MERCEDES AERO ENGINE.
BORE 140 ‰ STROKE 160 ‰
OVERALL LENGTH 2084 ‰ = 7 FT 2 in

by a split bush and gunmetal collar on the crankshaft.

Full details of the crankshaft design are given in Fig. 8.

Reduction Gear

In view of the fact that this engine is apparently the first attempt to introduce an indirect airscrew drive on any enemy aero engine in service, the construction of the reduction gear, as fitted to the 8-cylinder Mercedes engine is of considerable interest. The general lay-out is shown in Fig. 3, and most of the details of construction in Fig. 9.

The smaller, or driving, pinion of the reduction gear is keyed to the tapered extension of the crankshaft, the key being fitted parallel to the taper on the crankshaft. The driving gear is held in position on the shaft by a large locking nut, fixed by a grub screw.

As already stated, the front end of the driving pinion is supported on a large ball race, 148 mm. dia., carried on an extension of the boss in front of the pinion.

The larger, or driven, pinion is integral with the airscrew shaft, and is machined from a solid forging, the gear wheel having holes drilled through the dished webs of the wheel to save weight. The number of teeth on the driving pinion is 26, and on driven pinion 40, giving a speed ratio of 1.54:1. The diameter of the crankshaft pinion is 168 mm., and that of the airscrew shaft pinion is 250 mm.

The airscrew shaft is mounted on two large ball bearings, and is provided with a thrust ball-race, which is located by a double flanged ring, registering with a groove cut in the bearing housing. The diameter of the front ball-bearing of the propeller shaft is 136 mm., and of the rear ball-race 128 mm.

The airscrew hub is mounted on the tapered extension of the airscrew shaft extension, and is secured as shown by a key and also by the usual Mercedes airscrew hub locking nut, which carries a flanged locking plate on a stud in front of the nut. This flanged plate, or cup, is provided with notches, cut on the inside of the flange, registering with the flats of the hub locking nut, and also with the serrations cut on the outer surface of the airscrew hub, onto which the front flange of the hub fits.

A conical metal cap was fitted front of the airscrew hub.

(To be continued)

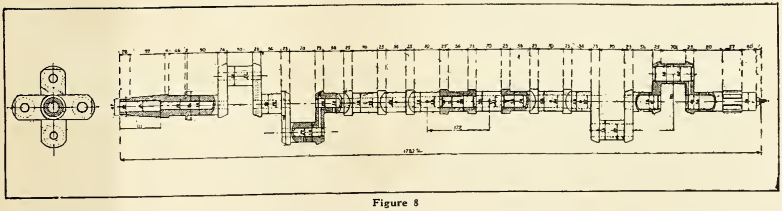


Figure 8

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

AERIAL MAIL PILOTS

- **Max Miller**
- **Maurice A. Newton**
- **Robert Shank**
- **Ed. V. Gardner**
- **V. P. Hollingshead**
- **E. Leroy Langley**

Aerial Mail Aerodromes:
College Park, Md.
Belmont Park, L. I., N. Y.
Bustleton, Penn.

AERIAL MAIL MECHANICS

- **Henry Wacker**
- **E. N. Angle**
- **A. F. Cryder**
- **Ed. C. Roll**
- **Wm. C. Read**
- **W. O. Beatty**
- **Chas. King**
- **A. C. Danielle**

Aerial Mail Service Flying Operations and Equipment Are Fully Under Post Office Control

The War Department authorizes publication of the following correspondence:

August 19, 1918.

Hon. NEWTON D. BAKER,
Secretary of War.

MY DEAR MR. SECRETARY: It is with pleasure that I have to advise you of the completion of the transfer of the equipment and the flying operations of the aerial mail service from the War Department to the Post Office Department on August 12. Permit me to thank you for the valuable and whole-hearted co-operation that I have received from the War Department in the inauguration and the operation of the aerial mail service. I desire to express my appreciation of the assistance received from Maj. Gen. W. L. Kenly, Col. Henry H. Arnold, Col. C. G. Edgar, Col. E. A. Deeds, Maj. William J. Fitzmaurice, Maj. Reuben H. Fleet, Capt. C. A. Willoughby, and Lieut. George J. Kinberg, of the Air Section, under whose jurisdiction and personal attention the flying operations of the aerial mail service came.

Commends Army Officers

Especially do I want to commend the six Army officers who operated the aeroplanes daily between Washington and New York with courage and conscientious regard for duty, and respectfully ask that this testimonial of their service be made a part of their military record.

Lieut. J. C. Edgerton made 52 trips on the mail route with but a single forced landing, due to an accident to a magneto in his plane. His total flying time was 106 hours and 36 minutes, and his total mileage was 7,155 miles.

Lieut. E. W. Killgore made 39 trips on the mail route, with five forced landings; 85 hours and 50 minutes total flying time with a total, mileage of 5,670 miles.

Lieut. Walter Miller made 48 trips on the mail route, with four forced landings; 60 hours and 50 minutes total flying time, with a total mileage of 4,975 miles.

Lieut. Stephen Bonsal made 38 trips on the mail route, with four forced landings; 74 hours and 33 minutes total flying time, with a total mileage of 4,975 miles.

Lieut. T. H. Webb made 41 trips on the mail route, with but one forced landing; 44 hours and 49 minutes total flying time, with a total mileage of 3,680 miles.

Lieut. H. P. Culver made 36 trips on the mail route, with but one forced landing; 47 hours and 52 minutes total flying time, with a total mileage of 3,045 miles.

I think it is a high tribute to the Army's training planes and their engines, as well as to the mechanical maintenance department, that out of 270 flights conducted by the Air Section in carrying the United States mail, covering a grand total of 421½ hours of flying, there were recorded but 16 forced landings.

From May 15 to August 12, the period during which the flying operations were conducted by the military authorities, a total of 20¼ tons of letter mail was dispatched between New York and Washington, at a saving of time of from two to two and one-half hours daily.

Sincerely, yours,

A. S. BURLESON,
Postmaster General.

Secretary Baker's Reply

August 19, 1918.

MY DEAR MR. POSTMASTER GENERAL: I have received your letter of August 19, notifying me of the completion of the transfer of the equipment and the flying operations of the aerial mail service from the War Department to the Post Office Department, and citing the names of those members of the military establishment whose assistance in the creation of this service has been especially noteworthy. It will give me great pleasure to place your commendation upon the military record of the officers whom you name.

In the meantime, permit me to express my high satisfaction that the War Department has been able to co-operate with the Post Office Department so effectively, and to bring this pioneer service so successfully into actual operation.

Cordially, yours,

NEWTON D. BAKER,
Secretary of War.

Hon. A. S. BURLESON,
Postmaster General.

Spain to America By Air Is Project in Madrid

MADRID—Captain Herrera, chief of the Spanish military air forces, has had a number of interviews with King Alfonso on the subject of an aerial postal and passenger service between Spain and the United States. The scheme also has been discussed at Cabinet meetings and it is said that a leading shipping company is willing to finance it.

The plan, it is understood, is to manufacture large airships capable of carrying forty passengers besides the mails. The rate charged for a passenger, if the scheme is carried out, will be $400, and letters will be charged for at the rate of $1 per hundred grams weight (about three ounces and a half). It is estimated the journey would take two and a half days.

Major Rhinehardt, Lieutenant-Colonel

Major C. K. Rhinehardt, in command of the "flying circus" at the Mineola aviation grounds, was notified on August 24th that he had been promoted to the rank of lieutenant-colonel. Major Rhinehart is now in charge of the squadron which is making a cross-country flight. The official notice of his promotion was telegraphed to him in St. Louis.

Physicians as Flyers

Dallas, Tex.—Aug. 22.—Aeroplanes equipped with medicinal aids and manned by a skilled pilot with a physician in the observer's seat are making good at the flying field here. They are kept ready during all hours of flying practice to enable medical help to reach fallen aviators.

Aircraft Chiefs Return from Inspection

Washington, D. C., Aug. 23.—Major General William L. Kenly, Director of the Division of Military Aeronautics, and John D. Ryan, Director of the Bureau of Aircraft Production, returned from the Pacific Coast, where they made an inspection of all flying and balloon fields and visited the spruce and fir country of the Northwest. They were very enthusiastic over the progress being made at the flying fields.

AEROPLANE ROUTES TO CROSS COUNTRY

Chain of Landing Places Will Be Established by War Department

WASHINGTON—Well defined air routes, with a chain of landing fields, are to be established across the continent, according to an announcement made by the War Department. Much of this work has in fact already been done.

The well-marked safe landings will supply to the pilots shelter and limited machine shop facilities, maps, charts and barometer and thermometer ratings. Most of the landings to-day are on military fields, but local boards of trade, chambers of commerce and business men's associations in rival cities and towns have begun to compete for the location of sites.

Reports to the Division of Military Aeronautics from field officers indicate that this movement, like the good roads movement, is steadily gaining momentum, and it is predicted before another year the aviator with an ordinary modern plane will be able to make a transcontinental flight without difficulty.

The Division of Military Aeronautics has determined to concentrate the ground school training in four universities—Princeton, the University of Illinois, the University of California and the University of Texas. The schools at Cornell, Ohio State University and the Massachusetts Institute of Technology have given excellent service, but their facilities are needed for other war training.

This cutting down in the number of ground schools does not mean any curtailment of the training programme, as the four schools selected were greatly enlarged some time ago and will be able, it is explained, to take care of all needs.

Aircraft Testimony Being Made Public

Simultaneously with the publication of the report of the Senatorial sub-committee, there is being made public the testimony of Secretary of War Baker, General Kenly, Director of Military Aeronautics, and other prominent Government officials. Lack of space prevents the publication of these testimonies.

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36 Aero Squadrons to Train at Mineola

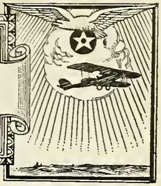
WASHINGTON—Thirty-six aero squadrons, or a training brigade of three wings, will be organized at Hazelhurst Field, Mineola, it was announced by the War Department. Of the forty squadrons recently authorized, therefore, Mineola draws 90 per cent. The remaining four squadrons will be organized at Houston, Tex.

According to the plans of the War Department, the squadrons will be quartered in groups of four or nine outlying fields.

They are to serve under field conditions simulating as nearly as practicable the conditions behind the lines in France. They will train as organizations, and it is hoped to furnish them completely with personnel and equipment so that when they have finished their training in the brigade very little additional training will be required before they take their places on the front. This will also enable them to be sent to France in complete squadrons instead of detachments as heretofore.

The first of the outlying fields on Long Island which will be used for the new enlarged training operations will be Brindlev Field at Commack, Lufbery Field at Wantagh, Mitchel Field at Mineola and Henry J. Damm Field near Babylon.

NAVAL and MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1. Report to places mentioned in order named for temporary duty.

Note 2. Report to Balloon Detachment, Fort Munroe, Va.

Note 3. Report to Standard Aircraft Corporation, Elizabeth, N. J. Wire DAP.

Note 4. Report to Army Balloon School, Arcadia, Cal.

Note 5. Report to Capt. G. L. Norris, Pittsburgh, Pa.

Note 6. Report to Madison Barracks, Sacketts Harbor, N. Y.

Note 7. Report to Dayton, Ohio. Wire DAP.

Note 8. Report to Lieut. H. F. Littlejohn, 480 Lexington Ave., New York City.

Note 9. Report to Aviation Gen. Supply Depot, Philadelphia, Pa.

Note 10. Report to Aviation repair depot, Speedway, Ind.

Note 11. Report to District Approvals Office, Pittsburgh, Pa. Wire DAP.

Note 12. Report to Little Rock, Ark. Wire DMA.

Note 13. Report to Aviation General Supply Depot, Middletown, Pa.

Note 14. Report to Major E. S. Moore, Buffalo, N. Y.

Note 15. Report to Ford Motor Car Co., Detroit, Mich.

Special Orders No. 178-183, Inclusive

A

Alcock, Warren Joseph	SLA; CGC
Akert, Edward Ruben	SLA; CGC
Amsden, Sherman Culver	SLA; CFT
Anderson, Edward Martin	SLA; GLC
Ainslie, Walter Melvin	SLA; RSD
Allen, James E	FRF
Ashcraft, Edward R	FRF
Agee, William T	FRF
Adams, William A., Jr	FRF
Allridge, Russell E	RWT
Annan, Duncan C	EOT
Anthony, Charles Augustus	SLA; RWT
Adams, Frank David	SLA; RSD
Aubert, Willie Alfred	SLA; RWT
Ailsworth, Richard E	TFT
Athey, Clifford Dowling	SMM
Anderson, Anthony A	WFO
Adams, David P	FRF
Ackley, Samuel F	FLA
Armstrong, Russell B	FRF

B

Bremer, Carl Arthur	SLA; RSD
Browne, Lucien Webster	SLA; TFT
Becker, Albert F	FRF
Byrns, Benjamin M	FRF
Bryan, Edward D	FRF
Buntin, Robert R	FRF
Boyd, Linn	FRF
Burdick, Harold B	FRF
Brock, William A	FRF
Bailey, Travis	SLA; KST
Bedell, James Ware, Jr	SLA; GLC
Bolser, Clark M	RWT
Bolsinger, Ray Clifford	SLA; RSD
Brown, Harry G	FRF
Bottom, Raymond B	FRF
Boudinot, Frank J., Jr	SLA; CGC
Beeson, William Branch	SLA; GLC
Baldwin, Charles Booth	SLA; SBI
Brown, George Reed	SLA; CFT
Benson, Hardy Moulton	SLA; CFT
Benedict, Maurice Tenny	SLA; CFT
Berry, Gilhert LeRoy	SLA; CGC
Briley, Carl Peter	SLA; CGC
Berry, Carl Davis	SLA; FOB
Barker, Rolan Sawyer	SLA; EOT
Blume, Albert Regis	SLA; DAP
Bacon, Christian O	PFO
Blotter, Richard G	FRF
Bennett, Robert Kenneth	LDT
Breese, Winfield S	FRF
Boonstra, Henry G	FRF
Beil, Richard Maybeck	FRF
Brutus, Lee Newton	SLA; LDT
Backus, Charles F., Jr	WFO
Bakala, Chester C	WFO
Bazley, Halsey R	WFO
Bassett, Lowell W	WFO
Beau, Lucas V., Jr	WFO
Blewett, Gideon A	WFO
Bond, Wilmer K	WFO
Bryant, Dan J	WFO
Boes, Walter P	WFO
Brown, Wallace A	WFO
Boez, Raphael, Jr	EOT
Braun, Arnold W	EOT
Buckmaster, Samuel A	EOT
Brady, Frank Lloyd	SLA; KST
Buchanan, Wallace Earl	SLA; TFT
Berkowitz, Ben	WFO
Bennett, Fred C	WFO
Billman, Elliott	FRF; WFO
Beutell, Russell Lee	SMM
Beil, Richard M	PWM
Broyles, Ralph E	PWM
Baker, Lee A	WFO
Barrett, Arthur E	WFO

Bible, Dana X	FRF; WFO
Bunn, James H	WFO
Banchor, Gordon H	FRF
Brown, Birch L	FRF
Booth, William H., Jr	TFT
Bone, Norfleet G	FRF
Blausfuss, William B	SLA; EOT
Balsley, Horace C	DMA
Bynum, Willis M	TMA
Batchelder, Chester Bernard	SLA; GLC
Bennett, Robert K	TFT
Brownstein, Maxwell	SLA; SBI
Blake, John R	EOT
Bush, Lyle K	FRF
Busk, Stephen Lionel	SLA; RSD
Bubb, Harry A	CPA
Brown, Harry George	SLA; LDT
Bickford, George Floyd	SLA; WFO
Beswick, John Sharra	SLA; LDT; FRF
Broman, Victor	FRF
Bailey, Augustus Oswald	SLA; RWT
Bauers, Frank W	SLA; VBW
Brown, Joseph	SLA; VBW
Benedict, Paul Marcus	MJA; DAP
Bonzein, Edward Barton	SLA; GLC
Brokaw, Harry Worthington	SLA; GLC
Bourman, Charles Alexander	SLA; MAC
Baker, Joseph B	WFO
Beehler, Charles H	WFO
Bent, Samuel Shaw	SLA; EOT
Boykin, Lynch D	FRF
Brown, Raymond Fassett	SLA; PMT
Brandt, Raymond Joseph	SLA; Note 10
Brown, Howard Adams	SLA; Note 5
Bullock, Edward L	Note 12

C

Carlin, Frank	FRF
Cook, Dean Charles	SLA; RSD
Cope, Robert William	SLA; EOT
Carmichael, Norvel Oscar	SLA; KST
Clarke, William B	FRF
Cook, Frank F	FRF
Connell, J. Weed	SLA; DAF
Cunningham, Wililam B	FRF
Clark, Howard E	FRF
Cowan, Robert S	DIK
Carruthers, William R	RWT
Church, Ross Emery	SLA; CGC
Cowe, Ellis A	RWT
Cunningham, George A	LHV
Carrico, Isaac B	DAF
Circle, Ralph Edwin	SLA; KST
Clawson, Harry Orville	SLA; CFT
Crandall, Gavin Devere	SLA; LDT
Cunningham, Alexander Hill	SLA; CGC
Crutcher, Merlin F	DAF
Crehore, John D	FRF
Clarke, Edmund Milton	SLA; SBI
Clarke, Frederic L	FRF
Christie, George Robert	SLA; ELA
Carlson, Arthur C	WFO
Clawson, Henry O	WFO
Chapman, Allen	EOT
Campbell, Robert L	FLA
Crandall, Norris I	WFO
Costar, Lloyd	TFT
Cooksey, David Jay	SLA; GLC
Clarke, Howard Pickford	SLA; EOT
Crowl, Leon Wesley	SLA; SBI
Clark, John E	WFO
Clark, Gorden W	WFO
Coleman, Robert H	WFO
Compton, Earl V	WFO
Compton, Howard	WFO
Currie, Kent D	WFO
Copley, Dewitt H	WFO
Curry, Ezra Benham	SLA; HHN
Chambers, Roger James	SLA; GLC
Cruickshank, Bruce D	FRF
Cain, Hubert O	TFT
Chetlain, Frederick Hamilton	SLA; CRI
Carlson, Hjalmar F	SLA; SMM
Card, Thomas Buell	SLA; ELA
Coffee, John Alfred	SLA; WFO
Carberry, Joseph E	EOT; WDM; NOTE 1
Curtis, Erland Lofton	SLA; RSD
Christy, Wynn O	TFT
Cotton, John B	TFT
Carter, Warren Rice	SLA; KST
Christopherson, Fred Carl	SLA; RSD
Cleveland, Lyman W., Jr	TFT
Cole Raymond T	FRF
Creighton, William J	WFO
Chase, Samuel W	WFO
Cotton, John B	TFT
Cochrane, Robert Malcolm	SLA; RSD
Circle, Ralph E	PWM
Conaty, Walter Joseph	FLA; Note 3

D

Dickinson, Clarende Roy	SLA; GLC
Dilworth, Dewees W	HHN
Duryea, Harold A	SLA; CGC
Dudley, William Allen	SLA; GLC
Davis, Nathaniel Penistone	SLA; GLC
Davenport, William H	DAP
Davis, George Edward	SLA; GLC
Dhein, Irwin Orion	FRF
DeShazo, Peter H	FRF
Dobson, Matt H., Jr	FRF
Disher, Harry P	CRI
Dana, Deane	FRF
DeViney, Albert Faris	SLA; EOT
De Vore, Ralph Roland	SLA; DAF
Duggan, James Reynolds	SLA; KST; FRF
Dolan, Clare Charles	SLA; ADT
Dorger, Clarence Alphonse	SLA; SBI
Demarest, Stirling James	SLA; DAF
Dooley, Payton Y	FRF
Dougherty, William A	BST
Day, Robert G	WFO
DeCamp, Merritt J	WFO
Decker, Kenneth N	WFO
Drake, Chester M	WFO
Duncan, John C	WFO
Dwyer, Martin J	WFO
Dawson, Thomas E	GLC
Davis, William R., Jr	FRF
Dresher, Stanley Oscar	SMM
Dougherty, William A	FRF
Dougherty, Gordon William	SLA; SBI
Dickenson, Robert W	FRF
Dally, Joseph Warren B	SLA; EOT
Davis, Eugene T	FLA
Dawson, Charles B	DMA
Davidson, Robert M	FRF
Devries, Joseph R	EOT
DeWald, William N	WFO
Durfree, Charles P	BST
Donnelly, James J., Jr	FRF
Dickason, James Frank	EOT
DesChamps, James W	WFO

E

Evans, Charles J	SLA; CAF
Emert, Joseph Rollo	SLA; CGC
Evans, William Kendall	DAP
Earley, George Emerson	SLA; CWT
Essig, Fred N., Jr	SLA; RSD
Ewan, Charles V	FRF
Elliott, Milton	FRF
Eastman, Andrew J	PFO
Ehrenberg, Conrad E	PFO
Eastman, Andrew J	FRF
Eilenberger, John T	KST
Evan, Lawton Bryan	SLA; PMT
Edwards, George H., Jr	SLA; CRI
Eaton, Charles Francis	SLA; SBI
Ely, Carl Brandes	MJA; DAP
Evans, Evan Cyefeliog, Jr	SLA; RSD
Early, Lawrence	WFO
Egbert, Perry T	WFO
Elkema, Emil C	WFO
Erickson, Harold	WFO
Erickson, Robert	WFO
Evans, Christopher J., Jr	FRF
Ellis, Oliver Everett	SLA; CRI
Eskind, Earnest	FLA
Edwards, Alton Wood	SMM
Edmondson, Walter O	FLA
Ehrlichman, Rodolph E	WFO
Ewing, Oscar R	CPA

F

Ferry, Joseph Rutherford	SLA; PMT
Fletcher, Wallace Robinson	SLA; RSD
Frew, Ralph C	FRF
Frazer, Allen Fulton, Jr	SLA; LHV
Fieweger, Thomas E	FRF
Fiester, Ritner I	FRF
Fancher, Willard L	SBI
Frank, Graham M	CAF
Foss, Alden Simonds	SLA; HHN
Ford, Edgar Kay	SLA; PMT
Fagan, Paul I	DMA
Fowler, Thomas	FLR
Fritshie, Arno R. G	SLA; VBW
Foster, Benjamin Randall, Jr	SLA; MAC
Fall, Harold A	WFO
Fischer, Karl W	WFO
Ford, Lewis E	WFO
Fraser, Walter	WFO
Freeman, Orville Burch	SLA; MAC
Fisher, Ewing Benedict	SLA; LDT
Fluer, Peter Earl	SLA; RSD
Flowers, John M	FRF
Fehlman, Leo G	WFO
Fox, Buell Kirk	SMM
Freeman, Orville B	WFO
Fuller, Robert N	TFT
Fisher, Floyd Clayton	SLA; TFT
Ford, Eugene Edward	SLA; Note 7

G

Grady, Anthony James	SLA; KST
Gregory, Omar B	FRF
Glezen, John C	SRC
Gore, William M	WFO
Graham, Charles F	WFO
Gabriel, William C	FRF
Greer, Everett M	FRF
Guppy, George	CAF
Guidera, Albert M	FRF
Garwood, Sterling M	FRF
Gilchrist, Hugh R	FRF
Goodwin, Grover	FRF
Goetjen, Floyd L	WFO
Grantham, Harry N	WFO
Graven, Carl M	WFO
Grimes, Carl A	WFO
Groah, Gordon L	WFO
Gross, Edward H	WFO
Garrison, William H	DMA
Geiger, William D	CAF
Grady, Anthony J	WFO
Gabriel, William Carl	SLA; CRI
Goddard, Glenn	SLA; LDT
Gardner, Roy B	FRF
Gard, Charles C	FRF
Gilfillam, William E	WFO
Goddard, Fred C	FRF
Garnier, Edward W	KST
Griffis, Claude F	SLA; Note 8
Gabrielson, Guy George	SLA; Note 15

H

Horn, Charles Adam	SLA; CGC
Hickman, Cecil Rogers	SLA; CAF
Herrink, Louis S	FRF
Hosack, Carl I	FRF
Hill, James Aquilla, Jr	SLA; TFT
Haserot, John Hawley	SLA; CGC
Horton, Russell Brewster	SLA; PMT
Hiatt, John B	PFO
Hogan, W. Clifton	HHN
Hardy, Arthur A	FRF
Hadeen, Edward A	ASM
Henderson, Hugh M	FRF
Hanchett, Frederick W	FRF
Harris, Joseph Pratt	SLA; RSD
Harding, William Kelly	SLA; RSD
Hogan, William N	FRF
Heffley, Armor S	PFO
Hansberger, Ernest S	PWM
Holmes, John W	FRF
Ham, David H	FRF
Howland, Dudley Sly	SLA; KST
Heartfield, Charles B	SLA; SRC
Henderson, Edmund Millard	SLA; KST
Heine, Bernhardt E	TFT
Hoyt, Howard C	TFT
Haywood, Chester B	TFT
Houston, Forest K	TFT
Henderson, Peter	RSD
Hessey, John Hamilton	SLA; CAF
Halsey, Wilmot N	WFO
Henderson, Denny E	WFO
Hook, Joseph A	WFO
Hood, Everett D	CRI
Hyde, Charles James	SLA; LDT
Hardy, Richard L	FRF
Haimes, Frank B	WFO
Hale, January R	WFO
Hall, George L	WFO
Harbage, Homer B	WFO
Hartman, Clarence A	WFO
Hayden, Max E	WFO
Healy, Michael V	WFO
Heng, Jacob A	WFO
Howard, Raymond E	WFO
Hughes, Albert E	WFO
Hunt, Ralph V	WFO
Hosier, John H	FRF
Hauck, Cornelius J	FRF
Harned, Doyce Harry	SLA; DAF
Hanna, Leonard C	FLA
Hogan, John Greeney	SLA; EOT
Hooper, Klein L	FRF
Hallberg, Lloyd C	WFO
Harris, Robert F	WFO
Hagner, John R	FRF
Hicatt, James P	FRF
Harwell, Ervin L	FRF
Haldeman, George W	FRF
Hueffner, Frederick William	SLA; CFT
Hilliard, Beverly Campbell	SLA; ADT
Hodgson, Harold C	WFO
Hayes, Charles L	FRF
Holmes, Charles Wesley	SLA; Note 11

I

Ingels, Giltner R	FRF
Ingoldsby, John LeRoy	CPA; DAP
Illges, Abraham	FRF
Ihrig, Howard K	FRF
Ives, Howard C	FRF

J

Jagger, Kenneth Reeves	SLA; CGC
Jones, Lloyd Bidwell	SLA; KST
Johnson, Walter Richard	SLA; RSD
Jones, Ralph E	PWM
Johnson, Raymond C	FRF
Jones, James D	FRF
Johnstone, Hugh R	FRF
Jones, Nathaniel R	SMM
Jenkins, James William	SLA; CWT
Johnston, Edgar Grant	SMM
Jakway, Clyde Clifton	SLA; CWT
Jesse, William R	FRF
Johnston, Douglas T	FLA
Jaccard, William N	WFO
Jones, Howard H	WFO
Jones, Ira M	WFO
Jones, Roy L	TFT
Jones, Roderick H	TFT
Jones, William F	WFO
Johnson, Donald Peter	SLA; EOT
Jensen, Karl	FRF
Juett, John C	FRF

K

Kennedy, James Henry	SLA; EOT
Kauch, Robert	KST
Keenan, Lorenzo J	KST
Kares, Edward Henry	SLA; GLC
King, Ivan R	APR
Kline, Mason Edward	SLA; GLC
Kinney, Charles L	FRF
Kile, Neil E	WFO
Kratzer, Henry A	WFO
Keyes, Nelson B	FRF
Korfhage, Harry George	SLA; GLC
Kendall, Harry A	FRF
Kesling, Ernest Erle	SLA; RSD
Knettle, Lemyrt Dix	SLA; DAF
Keally, Francis	SLA; ADT
Korman, Howard	SLA; KST
Kelso, Floyd Leaman	SLA; MAC
Kelly, Raymond James	SLA; CAF
Kelly, Andrew Park	SLA
Krum, Howard E	FRF
Kirkpatrick, Everett L	TFT
Knupp, Glenn H	MAT
Kipp, Eugene Harvey	SLA; CFT
Koch, Albert Nicholas	SLA; WFO

L

Lee, Harold James	SLA; EOT
Lancaster, Percy W	SLA; CGC
Lawrence, Herbert R	RSD
Lockhart, Frank	DIK

LaFon, Alphonse F .... FRF
Littlefield, Henry M .... FRF
Levy, Royal .... SLR
Leonhardt, Elmer G .... FRF
Locklear, Ormer L .... FRF
Lister, Harold R .... PFO
Leroyer, Charles P .... CAF
Largey, Hugh D .... FRF
Lockhorn, Clifford J .... BST
Lalley, Walter Rowe .... SLA; KST
Lucas, Gilbert L .... TFT
Lutton, Robert D .... WFO
Lyon, James L .... WFO
Ludwick, Frank McConnell .... SLA; LHV
Lathrop, Julian Langson .... SMM
Little, Roy Armstrong .... SMM
Leopold, Joseph .... HHN
Larkin, George Brandreth .... SLA; ADT
Leute, Garl Milne .... SLA; MAC
Lenderking, Louis Theodore .... SLA; KST
Littlejohn, Joe Lake .... SLA; DAF
Londrigan, Joseph A .... SLA: SMM
Lloyde, Robert Kellogg .... SLA; CUI
Lawhon, Guy Bryan .... SLA; LDT
Lincoln, William A .... FRF

M

Morehead, Hobart F .... LHV
Morrissey, Merle F .... LHV
Martin, John H .... PFO
Mensch, Sterling R .... FRF; PFO
Morgan, William T .... PFO
Mueller, Ralph H .... PFO
Malott, Volney T .... DAP
Muehlherg, Clarence E .... FRF
Mowry, Jared J .... WFO
Mulvihill, Bernard H .... WFO
Murray, John G .... WFO
Matheison, Joseph .... FLA
Macaulay, Charles R .... FRF
Mathews, George C .... BST
Murray, John G .... BST
Merrill, Basil Edmund .... SLA; CGC
Miller, Stanley Christian .... SLA; CGC
Morris, Edward S .... FRF
Masel, Max .... SLA; CGC
Mathews, George Clifford .... SLA; LDT
Miner, Vern E .... FRF
Massey, Raymond F .... FRF
Miller, Royall M .... FRF
Meredith, Martin Prentice .... SLA; CGC
Morrow, Dudley A .... FRF
Moore, Benjamin L .... FRF
Murchie, Howard Franklin .... SLA; HHN
Meyer, Frank Wellington .... SLA; SBI
Myers, Joseph A .... KST
Milnor, Paul C .... PWM
Morfa, Raymond J .... FRF
Mabry, Harry Cooper .... SMM
Magill, James Wright .... SMM
Morris, Charles Wilson .... SMM
Murphy, Charles Cornelius .... SMM
Morgan, Henry Suter .... SLA; EOT
Maxwell, Warren A .... GLC
Means, Leland M .... GLC
Morgan, Marion H .... GLC
Murphy, Gerald Joseph .... SLA; SMM
Monthan, Oscar .... SLA; TMA
Mahaffie, James E .... WFO
Mahler, James B .... WFO
Malik, Louis .... WFO
Mason, Clesson E .... WFO
Maxwell, Fred C .... WFO
Mayo, Francis P .... WFO
Mehlop, Thomas P .... WFO
Merrick, Ward S .... WFO
Merrill, Cylde H .... WFO
Meyer, Jerome G .... WFO
Miller, Wyman F .... WFO
Mills, Davis W .... WFO
Mitchell, William R .... WFO
Moffet, Ralph C .... WFO
Moreton, Amos L .... WFO
Morsch, Jesse J .... WFO
Morris, Thomas K .... FRF
Mefford, John Archdeacon .... SMM
Moore, James .... SMM
Miller, Edward H .... WFO
Moody, Martin Juel .... SLA; SBI
Mayer, Herbert Carleton .... SLA; RWT
Mast, Walker E .... WFO
Miskell, James B .... WFO
Massey, Ivor .... WFO
Martin, Douglas E .... TFT
Muirhead, Brian R .... WFO
Morrissey, John F .... WFO
Moynihan, Frederick Michael .... SLA; WFO
Moore, Harold Edward .... SLA; DAF
Malone, Austin M .... KST
Martin, William T .... TFT
Meyer, Edward .... TFT
Maher, Michael James .... SLA; EOT
Mead, Theodore S .... FRF
Moffitt, Howard Francis .... SLA; MAC
Murray, John Dayton .... SLA; RSD
Marberry, Jason Maurice .... SLA; CAF; FRF
Mucke, Henry Constant .... SLA; RSD
Mayfield, Charles R .... WFO
Mason, Edward John .... SLA; CAF; FRF

Mc

McKinney, Oakley W .... FRF
MacManus, Clare Clement .... SLA; EOT
McMurray, Robert J .... DMA
McDowell, Lloyd J .... PFO
McClintock, Arnold R .... LHV
MacDonald, Russell C .... BFT
McGrath, John William .... SLA; KST
McDonough, Edward F .... FRF
McCunn, John Niven .... SLA; CGC
McGovern, Edward T .... FRF
McNeil, Guy L .... PFO
MacDowell, Bruce A .... FRF
McCadden, Glen J .... BST
McEachin, James S .... FLR
MacKenzie, Hugh F .... LHV
McMillan, Neil T .... LHV
McAuley, Benjamin F .... BST
McCarty, Elsworth L .... CUI
McAbee, Louis A .... CPA
MacHarg, Malcolm .... SLA; TMA
McCadden, Glen John .... SLA; RSD
McVay, George E .... FRF
McArthur, John K .... GLC
McCormack, Earl N .... GLC
McElin, Bertrand J .... TFT
McCormack, Fred Bay .... SLA; MAC
MacAuley, Alexander V .... WFO
McNabb, Harold R .... WFO
McHugo, Jack R .... WFO
McKenny, Torry Thrift .... SLA; SMM
McGrath, John W .... TFT
McDonough, Andrew Leo .... SLA; CWT
McDougal, John Byron .... SMM
McGregor, Joel I .... FRF
McLean, Norman Reynolds .... SLA; RWT
McBride, Clarence E .... FRF
McKnight, Thomas Allan .... SMM
McKinney, William Henry .... EOT
McSherry, Frank D .... FRF
McDowell, Lloyd I .... FRF

N

Nolte, Julius Mosher .... CAF; FRF
Nissager, Fred E. M .... EOT
NacNary, Harry Calkins .... SLA; GLC
Niday, Hugh D .... DAF
Norgren, Nelson Henry .... SLA; MAC
Newlin, Harold Vance .... SLA; KST
Nemyer, Henry Earl .... SLA; CAF; FRF
Needham, Chauncey, E .... WFO
Neely, John H .... SMM

O

Orand, David H .... WFO
Owen, James P .... WFO
Oser, Chester Arthur .... SLA; CGC
Oswald, Fred .... FRF
Ozier, Richard P .... FRF
O'Dea, Bernard Joseph .... SLR
O'Connell, Robert E .... FRF
O'Neil, Joseph H .... FRF
O'Brien, Maurice Edward .... SLA; CGC
Ort, Karl S .... FRF
O'Leary, Arthur C .... Note 2
Ormsbee, Harry Selfridge .... SLA; TFT
Orr, Tasso V .... DMA

P

Park, James W .... WFO
Payne, Owen S .... WFO
Payneter, Henry M., Jr .... WFO
Perry, William L .... WFO
Peterson, Frederick R .... WFO
Pierson, Stanley H .... WFO
Prosser, Stuart A .... WFO
Price, Walter E .... FRF
Price, Hunter J .... FRF
Prentiss, Paul H .... FRF
Porter, Henry W .... FRF
Perry, Floyd L .... FRF
Pulliam, Ellis Page .... SLA; LHV
Park, Clifford George .... SLA; CGC
Peters, Crawford A .... FRF
Pierce, Leonard R .... FRF
Pieper, Clifford Earl .... SLA; EOT
Parmley, George W .... FRF
Pfiel, Paul F .... FRF; TFT
Phelps, Raymond W .... PFO
Pinkham, Henry P .... PFO
Pavey, Smith W .... FRF
Plosser, Joseph B .... FRF
Plantz, Edward C .... FRF
Payner, Walter T .... EOT
Porter, Oscar S .... EOT
Parker, Charles W .... FRF
Prouty, Eugene Royal .... SLA; CGC
Powell, Russell E .... CAF
Proctor, Harold L .... RWT
Phillimore, Walter Notman .... SLA; KST
Pilkington, Fred Wesley .... SLA; KST
Patterson, Frederick Beck .... SLA; Note 6
Puckett, Thomas Lytell .... SLA; MAC
Parish, John Joshua .... SLA; SMM
Pliska, Joseph S .... HHN
Poindexter, Francis .... SLA; WFO
Proctor, Ivan Lewis .... SLA; TMA
Preble, Robert Curtis .... SLA; RWT
Pfleger, Gustav .... SLA; VBW
Phelps, Edward George .... SLA; MAC
Parker, Troy La Salle .... SMM
Preisker, William Henry .... SLA; RSD
Parr, Eliza W .... FRF
Pharr, Query .... FRF

R

Rader, Alexander Knox .... SLA; CGC
Rowe, Charles Bar .... SLA; GLC
Ransom, Harold John .... SLA; CGC
Reed, Walter J .... FLR
Reed, Harold Varas .... SLA; DAP
Rodeny, Archer Ulysses .... SLR
Ragsdale, Grover C .... FRF
Rundle, W. B .... FRF
Reeves, Dache M .... FRF
Ranney, Lynn A .... FRF
Ramsay, Allan P .... FRF
Redmond, Forest H .... WFO
Reynolds, Arnold R .... WFO
Reeve, Jay F .... WFO
Reeves, Rober H., Jr .... WFO
Rice, Ralph W .... WFO
Ripperger, Clarence W .... WFO
Ryan, John N .... WFO
Reynolds, Leo F .... EOT
Rossiter, Ednor M .... EOT
Ross, Malcolm H .... EOT
Rountree, Andrew J .... FRF
Raney, John K .... FRF
Ransom, Harold B .... FRF
Rafferty, Reginald New .... SLA; KST
Rice, George E .... EST
Roberts, Fred G .... FRF
Robinson, William R .... CFT
Rady, William Jennings .... SLA; RSD
Rogers, Walter Eugene .... SLA; CGC
Raque, Carl P .... FRF
Read, Elmer Morton .... SLA; Note 6
Rogers, Rufus B .... RSD
Rice, Edward Thomas .... CPR; ALF
Radford, William Addison .... SLA; DAF
Riba, Leander W .... WFO
Robson, William W .... WFO
Russell, Howard F .... WFO
Rawlinson, Walter Shipman .... SLA; TFT
Ranney, Ambrose E .... FRF
Robinson, Edward A .... DMA

S

Scherzer, Ralph J .... EOT
Sinclair, William C .... EOT
Sloan, Harry .... EOT
Stalker, Willard C .... EOT
Stodder, John D .... EOT
Sykes, George E .... BFT
Sheridan, Hiram W., Jr .... FRF
Smith, Alexander D .... FRF
Shormey, George H .... FRF
Scoby, Hal A .... PFO
Smith, Frank H .... PFO
Stenhouse, Lester U .... PFO
Safford, Loyal R .... WFO
Savage, Joe W .... WFO
Scull, Leo N .... WFO
Seaver, Lloyd R .... WFO
Seymour, Leland S .... WFO
Shope, Leslie R .... WFO
Shreve, Arthur L .... WFO
Silverman, Michael M .... WFO
Soto, Earle .... WFO
Spangler, Earl O .... WFO
Spier, James E .... WFO
Steel, John A .... WFO
Spelbrink, Bernard Henry .... FLR
Scott, Leslie P .... FLR
Shotwell, Charles S .... FLA; DAP
Spitznagle, Fred August .... SLA; CGC
Sipp, Edward Arden .... SLA; DAP
Shewmon, Dan Dinmitt .... SLA; GLC
Shamper, James Robert .... SLA; CGC
Stanton, Edgar .... ELA
Sites, Harold D .... KST
Smith, George D .... FRF
Shea, Thomas F .... WFO
Snyder, James Lambdin .... CPA; VBW
Stapley, Edward R .... BST
Stallings, Alcy Lowell .... SLA; KST
Smith, John J .... FRF
Spencer, Eben S .... FRF
Smith, Vincent K .... FRF
Straub, Van Vanderbilt .... HHN
Schell, Harold W .... FRF
Stephenson, James R .... WFO
Stetson, Phillip C .... WFO
Slocum, Donald .... FRF
Steward, Wayne D .... FRF
Sanders, Thomas Jesse .... SMM
Shepard, Floyd W .... FRF
Sherrill, Guy P .... DIK
Shilt, Noble C .... FRF
Schenk, Lawrence .... CAF
Strickland, Ralph M .... CRI
Shippy, Leo C .... BST
Snyder, Laurence N .... FRF
Smith, Clarence A .... FRF
Smith, Clarence .... FRF
Skelly, John S .... FRF
Sanders, William C .... FRF
Stokes, William R .... RTT
Smith, Herbert Charles .... SLA; KST
Sanford, John D .... BFT
Snyder, Everett Whipple .... SLA; Note 6
Spencer, James Brookes .... SLA; Note 14
Saunders, John Jacob, Jr .... SLA; PMT
Swain, Roland H .... FRF
Sigward, Sylvester Lewis .... SLA; CAF; FRF
Stough, Robert Andrew .... SLA; WFO
Stuller, Gilbert Fitch .... SLA; FOT
Swinson, Casper D .... FRF
Sargent, Bradley Eckhardt .... SLA; MAC
Snedicor, Howard T .... HHN
Shimmon, Joseph Malek .... SLA; PMT
Smith, Harry Leonard .... SLA; DAF
Sandlin, James H .... WFO
Scott, Ernest D .... WFO
Sessions, Henry F .... WFO
Sproull, William C .... WFO
Seaton, John William .... SMM
Shepard, Frederick Burr .... SMM
Squires, Paul Revere .... SMM
Sizer, Theodore .... FLA
Smith, Charles F .... FLR
Smith, Herbert Hamilton .... SLA; FOT
Sherer, Bud Francis .... SLA; RSD
Sullivan, Mitchell Sanborn .... SLA; GLC
Shafer, Wayne .... SLA; DAF
Speck, Frank C., Jr .... SLA; FRF
Smith, Alexander Palmer .... SLA; CAF
Schumacher, Herman Oscar .... SLA; CAF
Soule, Arthur L .... FRF
Snow, William J .... FRF

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ITALIAN WAR AVIATION

By CAPTAIN GIUSEPPE BEVIONE

Chief of Italian Military Mission for Aeronautics

EVERYBODY knows that the war industries of all the Allied nations, and particularly the industries of aviation, draw from America the essential part of the raw materials they use.

The magnificent victories of the Allied armies during these last days, which have added so much glory to the American name make us wonder at the splendid results that might be obtained, were we able to realize that which we most need now —a supremacy of the air, so as to pursue the retreating foe with our squadrons of aeroplanes, spreading terror and disorder among its lines and destroying and closing railway junctions, roads, bridges and trestles.

As far as raw materials, industrial organization and man power are concerned, the Allies can produce and equip an aerial fleet at least ten times larger than that of the Central Powers. If this result can be attained in 1919, if within eight months the Allies together with this country, can count upon having in Europe ten thousand aeroplanes more than the enemy and will make them serve their purpose skillfully and inexorably, the war will be won. The foe's power of resistance would be struck at its very vital source, at its center of supplies, at the great factories of arms and ammunition, and bridges, railways and roads through which the armies at the front are kept in fighting trim. But in order to carry out in its entirety this simple plan (as nothing decisive could be attained unless it were fully developed) all of us, governments and peoples, must be aware of the absolute and obvious fact, that the aerial army is of the greatest import, and that aviation can give us a formidable contribution towards the refusal of any dastard peace compromise that Germany and Austria may try to impose upon us. Aviation is a sure means of victory, and to it we must devote without hesitation and without reserve all of our efforts and best resources.

I am betraying no secret in assuming that the closest agreement has been reached on this fundamental point between the American authorities in charge of the industrial and technical development of aviation and the Italian Commissioner for Aeronautics, the Honorable Chiesa; he has been such a vigorous incentive to our aviation industry that he has brought it within a few months to its magnificent development, well deserving of far reaching results. But in order to have an unlimited output of its powers and production, Italy is obliged to seek from this country an adequate and continually increasing quantity of raw materials, metals, wood, dopes and textile matter. It is an absolute necessity that we obtain such assistance from the American Government, of course, in perfect harmony with the needs of our Allies, and for this purpose I was sent to Washington and appointed Chief of the Italian Military Mission for Aeronautics.

I will endeavor to develop my program in the most logical and persuasive manner, proving to the Federal authorities that Italian aviation is well worthy of the assistance it is demanding of the generous and powerful American nation.

I will show you how efficiently raw materials that have been provided us are being utilized, and I shall keep the men in charge of the United States Aviation Board in close contact with every progress and acquainted with the great expectations that are in store for our Italian aircraft production.

This progress is indeed remarkable, and every Italian can justly be proud of it. Italy has today passed the critical period of experimental research and of uncertainties, always to be overcome at the beginning of new enterprises.

Today Italy is supplying its own needs in motors and planes entirely, besides using its own original types of machines; and within a few months all the machines flying at the Italian front will be of Italian manufacture and design, and equipped with Italian motors.

It is generally known that military aviation needs four types of machines: fighting, scouting, day bombing and night bombing machines. As to fighting aeroplanes, we now turn out two splendid types, the A-1 (so-called "Balilla") a machine developed from the S. V. A. of the Ensaldo factory; and the "Pe-Gamma" from the original plans of the Pomilio Works (recently taken over by the Ansaldo factory).

As to the other types of flying machines for warfare, Italy is well provided with models of her own, which are produced in large series. We have, in fact, two types of scouting machines of high value; the Sia 8-B (developed from the former 7-B type) made by the SIA factory, which is a branch of the FIAT, and the P.F. of the Pomilio factory, which, as previously stated, has been incorporated into the Ansaldo Works.

Two important raids were performed last year by the SIA 7-B aeroplane; that is, the flight Turin-Naples and return (1,004 miles) without landing, and Turin-London (700 miles) with the crossing of the Alps.

For day bombing, where speed and great power are essential, two Italian machines are ready today, which have already undergone the most severe tests. One is the SVA, built by the Ansaldo Factory, which can also be used for fighting and scouting, and has already accomplished the bombing of Inasbruck, besides performing the raid on Friedriechshafen. The second machine is the SIA 9-B, equipped with a FIAT engine of 799 h.p., which, owing to its speed and great power, can be flown over long distances and be used in broad daylight bombing.

For night bombing there are the biplane and triplane Caproni, now of international fame. The larger model of Caproni biplane (CA-5) equipped in Italy with three FIAT motors of 300 h.p. each, is without doubt superior to all similar types in existence, so much so that our Allies, American, British and French, have largely adopted it; and at the French front several Italian squadrons of Caproni are in active service, adding new records to their well-established reputation. It is also known today that at Mineola, L. I., the first Caproni built in the United States and equipped with American Liberty Motors has gone through its tests with the greatest success, and that the Federal authorities have since placed with American firms large orders of Caproni-Liberty aeroplanes.

I firmly believe that Italy can be proud of its aviation achievements and victories; as on the 15th of last June, the first day of the ill-fated Austrian drive on the Piave, 34 Austrian aeroplanes were downed, and only two of our machines were reported missing.

But no aeroplane, as perfect as may be its design and construction, could be of any service if not equipped with the best and most reliable motor, and if the capacity for production or the factories connected with the manufacture of aircraft were not equal to cope with the demands for the keeping up of the

A squadron of S. V. A. Italian scouts equipped with Spa motors, ready for flight. On August 10th word was received here that approximating 875 miles. While over Vienna the squadr

The propeller department of the Italian Pomilio factory which has now been taken over by the Ansaldo concern. Official photo

full efficiency of the aerial force. And here again have Italy's efforts been met with success.

The FIAT factory stands first as one of our largest manufacturers of aviation motors, with her two well-known engines, the A-12 and the A-14. The A-12 develops 300 h.p., and the A-14, 700 h.p., this being the most powerful motor used at the front for aviation by any of the Allies. The FIAT has a remarkably large output of these engines, and I regret that for obvious reasons I cannot give the exact figures concerning it. But I can say that our Aeronautical Department, which buys all this production, after having met with all of our own requirements, can afford to supply the Allies with an important number of these motors daily, in compliance with their urgent demands. Besides this, the FIAT has now ready a new model which will soon be produced in large series: the A-15 of 450 h.p., greatly reduced in size from previous models, light, accessible, and possessing new and important characteristics which will undoubtedly cause a further and greater development of our military aviation.

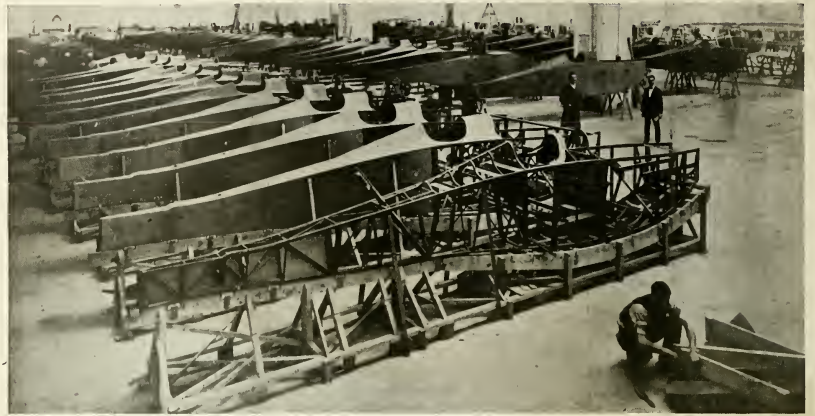
In addition to the FIAT, we have the SPA of the well known automobile factory by that name, which with some important changes and only a light increase in weight, has been able to develop her old 220 h.p., motor into a new 300 h.p. motor, without being obliged to change her former equipment and machinery—thus mastering a great technical and industrial success, and producing a new engine of slight specific weight and great power. These motors are already being turned out in large series, and will be of the greatest value to aviation, especially fitted to fighting aeroplanes.

Another important factory, the Isotta-Fraschini, produces high-grade machines, which have won reputation for their reliability and perfect workmanship; here again a new motor is ready, the I.F.V.-6, developing 300 h.p., greatly appreciated both by aeroplane manufacturers and pilots.

I shall not mention minor though excellent factories, among which excel with many others the Nagliati, the Colombo, etc.; nor the greater works which have taken up the manufacture of some of the motors described above, such as Bianchi, Tosi, Breda, etc.

The following figures may give a more correct idea of Italy's effort in the production of aviation motors: 1,500 motors a month being the present output, before the end of the year we shall certainly produce over 2,000 motors monthly, which means the astonishing figure of 24,000 aviation engines per year; and all of them of Italian design, of Italian construction, all of high repute, established after the severest tests. And

uadron of these S. V. A. planes, under the command of Captain D'Annunzio, had flown from Rome to Vienna and back, a distance opped over one million manifestoes.—Official photograph.



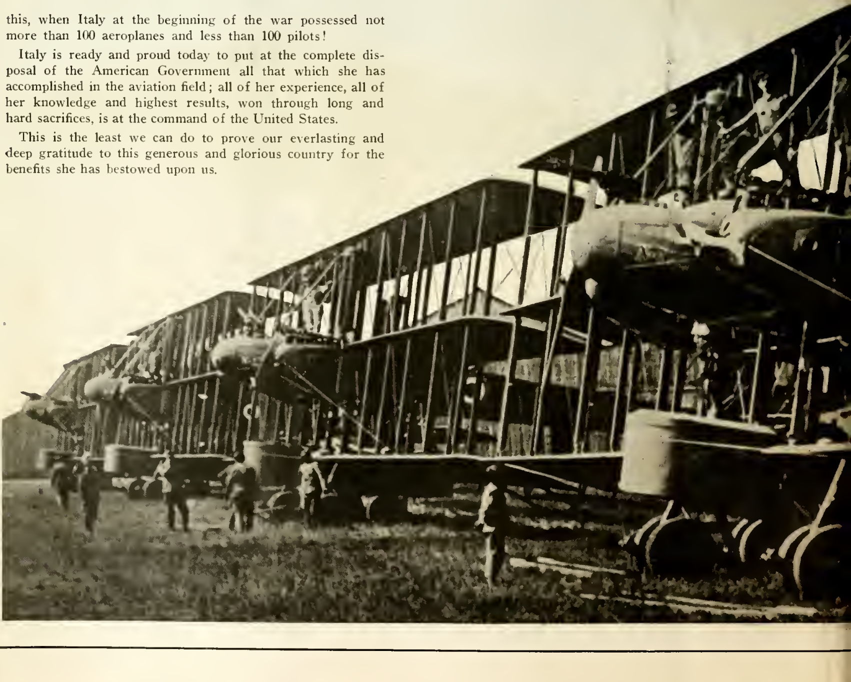
Official photograph.

View of the body assembling and covering department of the Ansaldo factory, one of the largest Italian aeroplane factories

this, when Italy at the beginning of the war possessed not more than 100 aeroplanes and less than 100 pilots!

Italy is ready and proud today to put at the complete disposal of the American Government all that which she has accomplished in the aviation field; all of her experience, all of her knowledge and highest results, won through long and hard sacrifices, is at the command of the United States.

This is the least we can do to prove our everlasting and deep gratitude to this generous and glorious country for the benefits she has bestowed upon us.



A squadron of the famous Caproni Triplanes which have been doing such wonderful work in bombing the German and Austrian positions for over a year. (Official photograph.)

FOREIGN NEWS

FRANCE

The official report dealing with aerial operations issued to-night says:

"On August 15 our crews downed or put out of action twenty-three enemy aeroplanes. Thursday night our bombing squadrons made several expeditions behind the battle zone and dropped more than fourteen tons of explosives on railroad stations at Nesle and St. Quentin, and on bivouacs at Champion and Guiscard, where several fires were observed.

"Other expeditions flew over the valley of the Aisne and the region east of it and obtained excellent results. Four tons of explosives were dropped on the railroad station at Thionville and on the region of Mezieres and Charleville. A total of 25½ tons was used."

Paris, Aug. 18.—German air squadrons have been very active in bombing towns behind the front the past two days. There were numerous raids on Rouen, where six persons were killed and five wounded. The Gothas flew as far as Havre, where no damage was done. Two consecutive raids on Vernon caused only material damage. Several warnings were given at Dunkirk and Calais during the period. At Calais some fifty heavy bombs were dropped on Friday night.

Paris, Aug. 18 (Night Report).—Artillery fighting continued very spirited during the day, especially in the region of Canny-sur-Matz and Beuvraignes. Local actions south of the Avre enabled us to take more than 400 prisoners.

Aviation—Eight enemy aeroplanes have been downed or put out of action, and three captive balloons set afire. Our bombarding machines in the night of August 17-18 dropped seven tons of explosives on the railroad stations at Bazancourt and Amagne.

It is confirmed that on August 8 Second Lieutenant Boyau downed his thirtieth enemy plane.

The French official sttaement for August 19th on aviation says:

"During the 18th three German aeroplanes were brought down and one captive balloon was sent down in flames. On the night of the 18th-19th our bombing squadrons dropped eight tons of bombs in bivouacs in the region of Berry-au-Buc and Guignicourt and the railway stations of Mesieres and Chapelet-sur-Retourne."

German aeroplanes bombarded Nancy on August 19th. It is reported that six of the civilian population were killed and a score wounded.

GREAT BRITAIN

An Admiralty announcement says:

"British light forces, accompanied by aircraft rennoitered the West Frisian coast Sunday morning. The British forces were heavily attacked by German aircraft. Six motorboats have failed to return. There was no other damage, nor any other casualties.

"The aircraft attacked a German airship north of Ameland and destroyed it, bringing it down into the sea in flames from a great height."

"Work in the air was actively carried on in all its branches Aug. 12. On the battle front our balloons were pushed forward close behind the line and sent down much useful information. Our artillery and reconnaissance machines were busily occupied all day.

"Enemy aeroplanes were active and there was much air fighting Thirty hostile machines were brought down and seven driven down out of control. One German balloon was shot down in flames.

"Forty-five tons of bombs were dropped by us during the twenty-four hours, the Peronne and Cambrai stations being heavily assailed.

"Twelve of our aeroplanes, including one night-bombing machine, are missing."

"On the night of Aug. 12-13 our air machines attacked a hostile aerodrome and trains, anti-aircraft batteries and searchlights and other ground targets with bombs and machine gun fire. All our machines returned safely.

"On the 13th the hostile aerodrome at Buhl was attacked. The results were not observed owing to bad visibility. Enemy aircraft, flying in large formations, were active on the battle-front. Twenty-nine hostile machines were destroyed in air fighting during the day and twenty-four others were driven down out of control. Four hostile balloons were shot down in flames. Five of our machines are missing.

The observation work for our artillery, carried out by aeroplanes and balloons, was steadily continued. On the night of August 10-11 a Gotha machine was brought down by our anti-craft fire, in addition to those already reported.

The British statement of August 14th reads:

The fine weather of Aug. 13 again enabled us to carry out a large amount of aerial work. The continual bombing of the Somme bridges, coupled with that of railway lines and junctions, which has taken place night and day since the beginning of the offensive, has interfered with the arrival of the enemy's reinforcements. It also has forced the enemy to employ large formations of air scouts in an endeavor to protect communications of much vital importance to his other arms, but concentrations of our air machines have effectively dealt with all opposition.

Fifty-eight tons of bombs have been dropped during the last 24 hours on the foregoing objectives, 21 tons by day and 37 tons by night.

A raid also was carried out on a hostile aerodrome from a low height by British and American aero squadrons. The raid resulted in six enemy machines on the ground being destroyed, and the hangars were set on fire.

In air fighting twenty-one enemy machines were brought down, and ten driven down out of control. Six of our machines are missing.

One of the most significant features of the aerial bombing offensive of the British is the loud response it has elicited from the German people, say British newspapers.

The bombing of England brought no complaint, but only renewed resolution; yet Germany, suffering the first preliminary pangs of British attacks, at once began to cry, and protest upon protest is pouring upon German authorities.

This means the British bombing offensive is effective; that far-reaching destruction has been caused to railway junctions and factories, and that German claims that British raids have accomplished nothing serious have been untrue.

Details of the damage caused by the British raids can easily be suppressed by the German censorship, and it is asserted there is abundant photographic and captured documentary evidence that the fears of the people are based upon real execution done.

The communication of Aug. 15 reads:

On the 14th inst. the activities of the enemy's airmen decreased somewhat, but our own machines carried out a great deal of reconnoissance and observation work and took many photographs. Twenty-two tons of bombs were dropped by us during the day, the principal targets attacked being Peronne, Roisel, the dump at Engel and the Bruges docks.

In air fighting, twenty-two hostile machines were destroyed and six driven down out of control. Fifteen of our aeroplanes are missing.

On the night of Aug. 14-15 the Somme bridges and the railways at Peronne, Douai and Cambrai were heavily bombed, a total of thirty tons being dropped with good effect. An enemy night flying aeroplane was brought down in flames. One of our night bombing machines failed to return.

"On August 15 the number of combats was not great. Four hostile machines were destroyed by our airmen and two German observation balloons were shot down in flames. Five hostile machines were driven down out of control. One of our aeroplanes is missing.

"Much reconnaissance work and a good deal of observation for artillery fire was successfully accomplished during the day. The total weight of bombs dropped by us in the course of the twenty-four hours amounted to 22½ tons. Two German aerodromes were heavily attacked, as well as several of the enemy dumps and railway connections. All our night bombing machines returned safely."

Sixty tons of bombs were dropped by British raiding machines on the German submarine bases at Zeebrugge and Ostend on August 15th, the Admiralty announced. Other military objectives also were attacked. Six German aeroplanes were destroyed when the aerodrome at Varssenacre was bombed. A direct hit upon a German destroyer off the Belgian coast was scored, followed by an explosion.

British aircraft brought down thirty-one hostile machines and one balloon, losing only three of their own machines.

The following communication on aerial operations was issued on August 17:

"On August 16 the weather continued fine, but the enemy's aerial activity was not great. Twelve hostile machines were brought down by our airmen and two were driven down out of control. Six of our machines are missing. Another hostile machine was brought down during the night.

"The hostile aerodromes of Haubourdin and Lomme were heavily attacked on the mornings of the 16th and 17th by a large number of our machines. Bombs were dropped from a low height, and at the former aerodrome six hangars were demolished and two machines standing in the open were destroyed. Three hangars were destroyed at the latter aerodrome, and at both places the living quarters were heavily fired on, and several fires were started.

"More than forty tons of bombs were dropped by us during the twenty-four hours.

"On the night of August 16-17 our air squadrons attacked four hostile aerodromes and two railway junctions. The visibility was very poor and observation of the results was difficult.

"In addition to the two British machines reported missing on August 16, a third machine has failed to return."

Thirteen enemy aeroplanes were destroyed in combat August 17, according to the reports of the French and British War Offices. The British assert that they brought down five enemy machines and that three of their own machines are missing.

Bombing raids by both the British and the French are being continued against the German rear lines. The British report thirteen tons of bombs dropped.

German squadrons have been active in bombarding towns behind the front during the last two days. There were numerous raids on Rouen, where six persons were killed and five wounded. The German Gothas flew as far as Havre, where no one was killed and no damage done. Two consecutive raids on Vernon caused only material damage.

Several warnings were given at Dunkirk and Calais during the period. At Calais about fifty heavy bombs were dropped.

The Air Ministry issued this statement on August 19:

"On the night of August 18-19 our squadrons attacked hostile aerodromes and landing grounds. Various ground targets were also attacked with machine gun fire. One of our machines has failed to return.

"On August 18 we brought down six hostile machines and shot down a German balloon in flames. One of our aeroplanes is missing.

"Sixteen tons of bombs were dropped by us during the day and the following night on different targets."

The official communication on aerial operations, issued August 20, says:

"Early in the morning of August 18 some of our squadrons combined in a very successful attack on the Phalemrim aerodrome, south of Lille. Many bombs were dropped from a low altitude, and machine guns were used with good effect on ground targets. Several aeroplane sheds were hit and big fires started.

GERMANY

The official report received August 16th from Berlin dealing with aviation says:

"Yesterday we shot down twenty-four enemy aeroplanes."

On August 20th: "In nocturnal flights our bomb squadrons successfully attacked with bombs and machine gun fire the adversary who was densely concentrated in villages and on railroads and highways."

A War Office announcement issued August 17 says:

"Our chaser aeroplanes shot down four large English battleplanes that attacked Darmstadt with bombs."

ITALY

The War Office statement of August 16 reads: "Four hostile aeroplanes and a captive balloon have been brought down."

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

COMPRESSED AIR MOTOR

THE Compressed Air Motor is the simplest of the reciprocating type of motor and the one described in this article is the simplest of this type and by far the easiest to build. This motor was designed to eliminate all the difficult parts generally found in motors of this kind and can be made by the use of such simple tools as a vise, drill press, file and a small soldering outfit, using illuminating gas, which will be illustrated in another article. (I would advise the model builder waiting for the next article, before starting on this motor, as it will contain illustrations of a mouth blow torch, improvised lathe, etc., for building this engine.)

The motor herein described has successfully flown a model aeroplane and is the lightest practical compressed air motor ever made; its weight is 1½ ounces. This saving in weight has been accomplished by doing away with the usual heavy crankcase, double bearing crankshaft and valve construction. You will note that in this motor the propeller shaft acts as the crankshaft distributing air intake and exhaust release.

I would advise the model builder to study the drawing carefully before building the motor, in order to get a fair idea of just what it will look like when built, otherwise you will have trouble in assembling. When soldering use as little solder as possible especially on the working parts, otherwise solder will run in and "freeze" the parts together.

To construct the motor make the cylinder and crankcase part first. This is made from the "Female" part of a fishing rod ferrule. These fishing rod ferrules can be purchased at most hardware stores or any fishing tackle store. When purchasing ask for a number 9 or ⅝" ferrule, and be sure that the male part has a closed end, as this part is used for the pistons. It will be necessary to buy two male parts, as it is necessary to have two pistons.

The part marked "OFF" is cut off with a small key filed, and then the space for the crankshaft is filed or cut with a fine hacksaw, then drill a 5/16" diameter hole at a point midway between the two ends. Two discs of thin metal with holes ⅛" in diameter are soldered in each end to form cylinder heads.

The two pistons are made from the top parts of the "male" ferrule, as in Figure 2, the parts marked "OFF" being discarded as before. The pistons are ⅜" long and are shown in Figure 3. The hole in the top is 3/16" in diameter and is for what we shall term the "wrist pin" or terminal for the connecting rod.

The cup washer is used on top of the piston to keep the air from leaking past the piston. It is much the same as the washer used in a bicycle pump plunger, made from a disc of thin soft leather ¾" in diameter, and soaked in oil to make it more pliable, and shaped as shown in Figure 4 to fit in the cylinder.

Two connecting rods are made of ⅛" brass tubing 1⅜" long flattened at the ends by hammering (after bringing it to a red heat over a flame to make it softer) and drilling holes, ⅛" and 1/32" in diameter at the ends as shown in Figure 5.

The "wrist pin" or connecting rod terminal is made from a 3/16" brass bolt as shown in Figure 8. The assembly of the piston, cup washer and connecting rod is shown in Figure 6. The connecting rod is fastened to the 3/16" brass bolt by filing a slot at one end and drilling a 1/32" hole through the forked ends; the small hole of the connecting rod is then placed in between the fork and a piece of wire or a nail 1/32" thick is shoved in place and riveted, but loose enough to allow the connecting rod to move freely. A nut is then screwed on the bolt as shown in Figure 8. The bolt is next shoved through the hole in the piston, and the cup washer put in place. A disc of very thin metal about ½" in diameter should be put over the cup washer to hold it firmly in place when moving up and down in the cylinder. The top nut is then put on and the bolt cut off close to the nut, after making provision for the guarding of the nut working loose when the engine starts running. This can be done by hitting the portion of the bolt extending over the nut, a few taps with a hammer forming a sort of rivet. This makes up the piston and connecting rod assembling (see Figure 6).

The crankshaft is made up from a taper pin, piece of flat steel and a piece of ⅛" drill rod. The stud or crank pin in Figure 9 is made from a ½" piece of ⅛" drill rod, the largest diameter extending for ⅜" then ⅛" or 1/16" diameter. This small part can be made by a file or on the improvised lathe appearing in the following article.

The crank throw is made of 1/16" steel ⅝" long to the shape of the Figure 10.

The shaft, Figure 11, you will notice is tapered. This is what is known as a number 2 taper pin 2" long, and can be purchased at a hardware store. The slots are filed out to the sizes and distances shown. They are 1/16" deep.

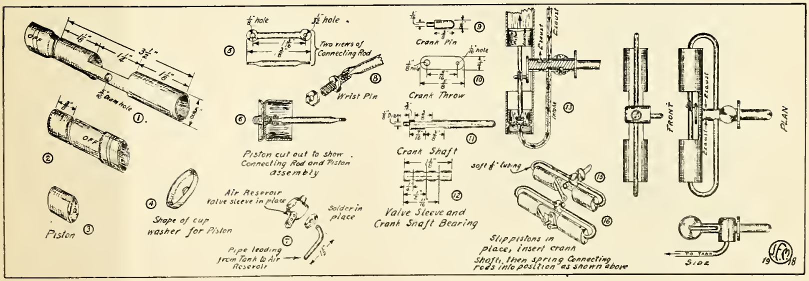
When these parts are finished, the end of Figure 11 should be placed in the ⅛" hole of Figure 10 and riveted. When in position the flat piece in Figure 10 should be extended in the direction of the slats of the shaft. *Not* as shown in the crankshaft assembly in Figure 13, which is only done this way to show the working of the engine.

The stud, Figure 9, is next put into place, the small end inserted into the 1/16" hole of the crank throw and riveted.

The outside of the valve is made from a heavy walled 5/16" outside diameter brass tubing. 1/16" holes drilled along straight lines directly opposite each other and the distances apart show in the Figure 12. Before cutting the tubing to the length given, it should be reamed out with a Number 2 Tapered Reamer to fit the Number 2 Taper Pin. This is bought in a hardware store for a small price, as is the handle used for it. The reamer is used to cut an inside taper in the tubing to allow a snug fit of the crankshaft. Care must be taken to do this job right otherwise this valve will leak and the engine will lose considerable power.

When reaming, the crankshaft should be inserted from time to time until the flat piece in Figure 10 just touches the tubing. Take care not to get the hole reamed too big.

(*To be continued*)


OFF
⅛"
1¼"
3½"
1⅛"
5/16 Diam hole
⅝"
①.
⅜"
OFF
②
Piston
③
④
Shape of cup washer for Piston
⅛" hole
1/32" hole
⑤
1 1/16"
1⅜"
Two views of Connecting Rod
⑧
Wrist Pin
⑥
Piston cut out to show Connecting Rod and Piston assembly
Air Reservoir Valve sleeve in place
Solder in place
⑦
Pipe leading from Tank to Air Reservoir
1½"
1/16
⑨
Crank Pin
1/16" hole
⅛" hole
5/16"
⅝"
⑩
Crank Throw
⅛" Diam
3/16"
⅜"
7/16"
⅜"
⑪
Crank Shaft
1⅛"
¼"
½"
11/16"
⑫
Valve Sleeve and Crank Shaft Bearing
Exaust
Exaust
Intake
⑬
soft ⅛" tubing
⑮
⑯
Slip pistons in place, insert crank shaft, then spring Connecting rods into position as shown above
FRONT
Exaust
Exaust
PLAN
TO TANK
SIDE
19 J.F.M. 18

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Wings. Solo

No more foot-slogging on the pavé or in the mire
Never again shall I curse a pack that jams in the communication trench,
My route is above the charging clouds, thank the kind heavens,
With no panting corporal to make me double on the duck-boards,
Close to the wine-dark blue ceiling of the uttermost air,
Where the morning Archies sing together,
And the great howitzer shell slowly rounds off his dreadful arc.

No dirty dug-out smash for me,
Mine's a clean death when it comes;
But before then I'll put "paid" to a few Hun accounts,
Dive to see 'em crash,
And drop 'em a wreath next week.

Hey for the steep-climbing spiral,
With the contented engine-purr for abbligato.
Heart leaping. Every pulse dancing.
And no care for the wind-pocket, and the sudden lurch and drop,
I've a super-seaman stomach for the giddy plunge, thank the stars!

What does she say? Ninety?
Here's for a few more revs.
Ease her. Pull the stick. Let's have a purler or two.
Oh, the queer whirling green world with the gray ribbons of road,
And the feebly-crawling dots of unwinged folk,
Little laboring ants with their straw-burdens——

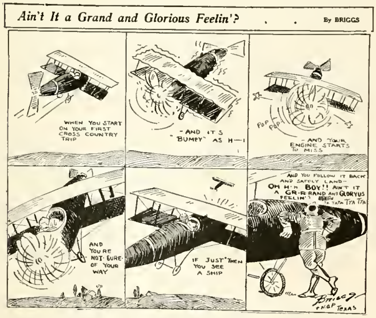
Steady again.
Is it the wide earth between my knees, or the white-piled cloud?
Start her up. Make a bit more height.
See the steel-track below grow narrower,
The little idly-puffing loco. jet tinier steam-cloud,
And creep vainly after me on my way.
See the fieldlets contract, and the earth-bowl grow rounder,
Till the far-off edge of the land comes in ken,
And the dazzling fringe of winking purple-shot sea jumps to my eyes.

Now for a whirling swoop and dive to finish.
There's a swift check for an eager leaping heart.
Whoosh——What a wind pressure.
Flatten. Start her up. Lift her a bit.
She taxies gently. That's what I call a landing.

All clear, sir . . . engine of the sweetest.
(Not a stammer or a tremor.
Hooray for a steady tongue.)
I shall make a scout for sure.
I'll spit swift death soon to the overdaring Hun that doesn't know his limits.
I shall zoom till my bullets buzz in his thick gross ears,
And see his climbing planes rush for a safe landing,
Like pigeons that scatter when the hawk swoops suddenly, dreadfully,——

But now for a bath. And this evening for rehearsal.

SIGNALS.


Ain't It a Grand and Glorious Feelin'? . . By BRIGGS
WHEN YOU START ON YOUR FIRST CROSS COUNTRY TRIP
-AND IT'S "BUMPY" AS H—!
POP POP
-AND YOUR ENGINE STARTS TO MISS
AND YOU'RE NOT SURE OF YOUR WAY
IF JUST THEN YOU SEE A SHIP
AND YOU FOLLOW IT BACK AND SAFELY LAND—
OH H'M BOY!! AIN'T IT A GR-R-RAND AND GLORYUS FEELIN'?
TA TATA TYA TYA
BRIGGS
TEXAS

Courtesy N. Y. Tribune

The Limit

Eleven o'clock! and all was still,
The moon had risen o'er the hill,
It seemed like "nothing doing."
But when the C.O. sent for me
My instinct could not fail to see
That there was trouble brewing!

"Go down to Hants," said he, "by air;
The night is clear, the heavens are bare,
And you'll enjoy the journey.
Take these despatches with you—see?"
And, saying thus, he blinked at me
Like some cross-eyed attorney!

O Sleep! when wilt thou come again?
Last night, I flew to Salisbury Plain,
And now I'm bound for Beaulieu.
These flying stunts are jolly fine,
But this is where I draw the line,
My soul becomes unruly.

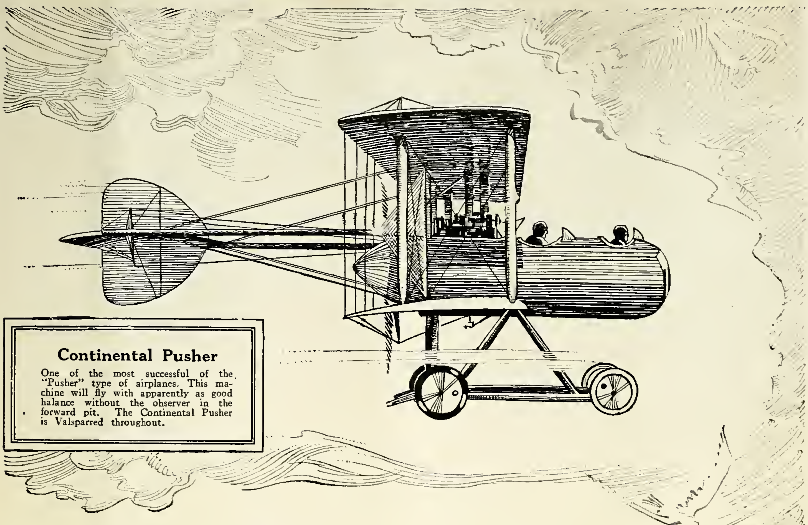
But discipline one can't evade,
So in my fur-lined coat arrayed
I started in my Sopwith.
She was a single-seater 'plane.
Alas! I felt that I would fain
Have some one to talk shop with!

"The night is clear," the chief had said;
But now, dark clouds swarmed overhead
And fog-banks in a quarry.
My hope, my nerves, my cap were gone,
But recklessly I blundered on,
And whistled "Annie Laurie."

The rain came down—and so did I!
I thought it meant a fond good bye;
But soon I got her righted.
Then on I went for hours and hours
Mid gusts and currents, storms and showers,
Until my goal was sighted!

"Oh, sergeant! what a ghastly ride!
Pray take these documents inside.
Night-flying I disparage."
The sergeant stared at the address,
Then, grinning, said, "Wrong shop, I guess!
This station, sir, is—HARWICH!"

G. R S.



Continental Pusher

One of the most successful of the "Pusher" type of airplanes. This machine will fly with apparently as good balance without the observer in the forward pit. The Continental Pusher is Valsparred throughout.

The latest types of Aircraft are Valsparred

Valspar is used to protect airplanes and seaplanes because it has proved its high efficiency in long and arduous service.

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Our Airplane Service Department will gladly give the benefit of its experience on request.

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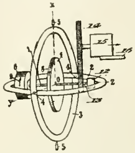
RECENT AERO PATENTS

BY WILLIAM N. MOORE

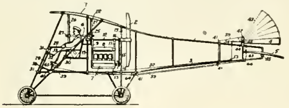
1,180,365. METHOD OF GYROSCOPIC CONTROL. Herman M. Anschutz-Kaempfe, Neumühlen, near Kiel, Germany. Filed Jan. 3, 1912. Serial No. 669,264. (Cl. 114—24.)



1. In torpedoes adapted for ejection from a torpedo tube and provided with a rotary, cardanically suspended wheel, the method of control which comprises rotating the wheel at a predetermined speed while the torpedo is being ejected and while the gyroscope and torpedo are fixedly locked together, and in subsequently after the gyroscope is unlocked materially increasing the speed of rotation of the wheel electrically, for the purpose specified.

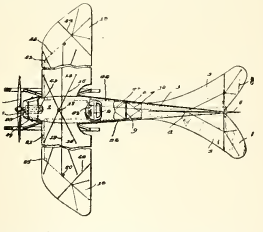
2. In torpedoes adapted for ejection from a torpedo tube and provided with a rotary, cardanically suspended wheel, the method of control which comprises mechanically rotating the wheel at a constant speed as the torpedo is being ejected and while the gyroscope and torpedo are fixedly locked together, and in subsequently after the gyroscope is unlocked materially increasing the speed of rotation of the wheel electrically for a predetermined time, for the purpose specified.

1,174,679. AERIAL VEHICLE. Clarence W. Carroll, Rochester, N. Y., assignor of two-tenths to Farnum F. Dorsey and three-tenths to C. Schuyler Davis, Rochester, N. Y. Filed Mar. 12, 1910. Serial No. 549,043. (Cl. 244—29.)



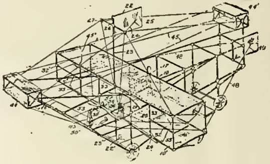
1. An aerial vehicle having, in combination, means for steering the vehicle horizontally, controlling-means co-operating with the steering-means and operative automatically to control the direction of operation thereof, and manually operable means connected with the steering-means and operable to throw the steering-means into operation in the direction determined by said controlling-means.

1,176,593. MONOPLANE. Stephen F. Naughton, U. S. Navy. Filed Feb. 12, 1915. Serial No. 7,890. (Cl. 244—14.)



In a flying machine, the combination of a hollow body or nacelle having a suction opening in the front portion and sets of discharge openings in the side portions of its bow, a supporting surface carried by the body, suitable steering and stabilizing means, a motor positioned in the bow of the body and having its shaft extending forwardly through the suction opening, radiators at the sides of the bow of the body having suction producing vanes projecting outwardly through said discharge openings, so as to lie in the path of the wind and directly in the path of the air from the propeller, whereby a suction is produced within the bow to draw cooling drafts of air thereinto through the suction opening and discharge the same through the said side discharge openings, and conductors extending between and connecting the radiators with the water jacket of the motor.

1,180,271. AIR-CRAFT. John P. Tarbox, Washington, D. C., assignor to Tarbox Safety Aircraft Company, a Corporation of Delaware. Filed Feb. 10, 1911. Serial No. 607,735. (Cl. 244—29.)



1. In combination an air-craft, a vertical laterally deflectable balancing plane a certain distance above the craft, a similar plane of the same effective area a different distance below the craft, and means for simultaneously deflecting the said planes in opposite directions, the areas of said planes being in the ratio of said distances to each other.

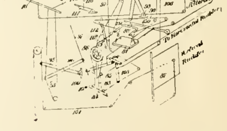
2. An air-craft comprising a main supporting surface, balancing means, lateral steering means, means for operating the balancing means, means for operating the lateral steering means, and a lost motion connection between said two operating means.

3. In an air-craft, laterally balancing devices, means for operating the same, lateral steering means, means for operating the same, and a mutilated gearing connection between said two operating means.

4. A steering gear comprising a fixed vertical rotable post, a lateral steering rudder connected thereto for operation through rotation of the post, a substantially vertical lever hinged to said post, elevating planes connected to said lever, a horizontal lever hinged to said vertical lever, and balancing devices connected to said horizontal lever, said horizontal lever being adapted for movement to control each of the several steering devices connected to the mechanism simultaneously.

5. In an air-craft, the combination with a supporting member, of a pair of balancing surfaces each pivotally mounted in a vertical plane one above and the other below said supporting member, and an interlocking connection between said surfaces permitting their simultaneous movement in the same direction under influence of lateral air pressure.

1,180,275. BALANCING MECHANISM. John P. Tarbox, Washington, D. C., assignor to Tarbox Safety Aircraft Company, a Corporation of Delaware. Filed Nov. 14, 1911. Serial No. 660,249. (Cl. 244—29.)



1. In an air-craft, a motor for driving the same, means for changing the speed of the motor, an automatic balancing mechanism driven from the motor, balancing devices operated by the balancing mechanism, and changing means associated with the balancing mechanism and operatively connected with the means for changing the speed of the motor whereby the relative speed of operation of the motor and balancing mechanism is changed.

(*Continued from page* 1214)

As early as October, 1917, at an international conference in Paris concerning a general aviation program, the Italian inventor, Caproni, was summoned to meet Col. Bolling, one of the heads of the aviation section in Paris. An arrangement was ultimately made by which Capt. D'Annunzio and a force of workmen and engineers were to be brought to America to produce in American plants Caproni machines. Capt. D'Annunzio and 19 of the best men of the Italian factory arrived in the United States on January 17.

In January, 1918, the Standard Co. was given a verbal order for 1,000 Capronis, 50 to be assembled and 950 to be sent overseas knocked down. Drawings were prepared, but no official order was given for the machines.

On January 25 Capt. D'Annunzio and his men came to the plant, began work on a handmade machine. A witness describing the transaction states that—

"They (the aeroplane authorities), in February, began to back and fill on whether they were going to build Capronis in quantity, and by March 2 it was practically settled that they would not build Capronis in this country at all, except the ones we were working on and two or three for experimental purposes.

"As a result of that we took the Handley Page as a substitute."

Capt. D'Annunzio states that he had expected upon his arrival in this country that everything would be ready. "They were wiring and cabling Italy, asking for the engineers of the Caproni plant. I requested Gen. Tozzi, who is head of the Purchase Mission, in Washington, to help me clear up the matter. So we provoked a lot of meetings between myself, Col. Deeds, and some other officers. * * * It was just the same as before, because no decisions were reached. * * * I found they were undecided as to whether they should make that machine, although demonstrations had been given before the European military mission," etc.

Finally Capt. D'Annunzio was authorized to build the first experimental machin for American engineers. That machine was finished and flown on July 7. In the meantime, and about April 12, the Fisher Body Co. obtained an oral contract for 250 Capronis, which was later canceled. Again, about May 18, 1918, the Curtiss Aeroplane Co. was given an order for 500 Capronis, and on the same day the Fisher Body Co. was given an order for 500 Capronis. It is understood, however, that nothing will be done to carry out this order until the experimental machine has been tested out. This precaution is proper.

During the interval of delay both of the Italian pilots who came to this country were killed in other machines, and the Caproni program is now awaiting the arrival of Italian pilots and the testing of the experimental machine.

Over 12 months of time has been thus consumed since the Caproni came under serious consideration.

Plans for the Handley Page machine were supplied to the Signal Corps in the summer of 1917 by the owner, with full permission to use them. Its engineers made a number of changes in them, beyond which nothing was done with them. Hence, the representative of the owners in the early winter demanded their return. They were delivered to him as changed.

In February last contracts for 1,000 sets of parts, afterwards reduced to 500 sets of parts, were made with various contractors, to be assembled in Great Britain for the use of the American Army. From 60 to 90 days are required for the assembly of a Handley Page machine. Twenty of these have been embarked, and we are informed that they will continue to go in constantly increasing quantity, reaching 140 for the month of February. Had these contracts been let last October they could have been completed and delivered by the 1st of July.

One sample machine constructed by the Standard Aircraft Corporation was completed and given its initial flying test on July 6 last. If further tests prove satisfactory the design will go into quantity production. Had the machine been ordered last summer it should be in quantity production now.

The production of training planes has been fairly adequate. One type, the Standard, of which there were 1,200, has recently been discarded because the Hall-Scott engine which drives it has proven unsatisfactory, but there is no reason to apprehend that training plane production will fall below the requirements of the service. The designers and manufacturers of this plane insisted that with a good engine it is all right, and this insistence will be tested. If successful they can be made available hereafter. But Gen. Kenly and his assistants found them highly dangerous because of the motor and ordered their retirement. The machines cost the Government about $6,000,000.

The De Haviland 4

The De Haviland 4 is the only so-called fighting plane now in actual production. Outstanding contracts call for 8,500 of them. They are being manufactured by the Dayton-Wright and the Fisher Body companies, with smaller contracts to the Standard and one or two other producers. On August 1 a total of about 1,000 of these had been delivered, all but a few of which had been turned out by the Dayton-Wright concern.

The first plane of this type was embarked for France during the latter part of February of this year, but never reached port. Up to July 1, 286 had been shipped abroad, of which 67 had reached headquarters in France. On August 1, 601 had been embarked. A number of them were delivered to Gen. Pershing's headquarters in June, and upon inspection were found to contain many defects, some of which were serious, others of less importance. Under date of June 26, Gen. Pershing cabled the War Department enumerating many defects and stating explicitly that the machines could not be used until some of them were corrected. Also that all planes of this class should be thoroughly tested and inspected before being shipped to him. This obvious requirement Gen. Kenly had insisted upon observing, but sent them over in the instance considered without doing so because of an overseas order requiring it.

Some of the defects enumerated in this report, in the opinion of every expert flyer, who has been examined by the committee, rendered the machines more than ordinarily dangerous. Their opinions differed as to whether or not corrections can be made to make the machines safe, but the assertion that the plane is very unsafe in the condition in which it has been up to this time delivered from the factory was practically unanimous. Deliveries of the machine continued notwithstanding, and many were sent to France in precisely the condition complained of in Gen. Pershing's cable. The explanation offered for continuing delivery of these defective planes is that the corrections could be made overseas, and a force of American officers and mechanics under command of Lieut. Col. Hall was dispatched to France about the middle of July with orders to make them. Your committee is of opinion that the planes should never have been permitted to leave the factory in their defective condition, and the fact that they were permitted to go shows either a lack of appreciation of the situation, a disregard for it, or a very poor system of inspection. On August 2 an order was issued to all the factories directing that no more of them be delivered until the corrections required were made. We are informed that production under these new conditions is about to be resumed.

In July 155 of these planes were delivered to the Navy, about 50 of which were shipped abroad and approximately 100 crated and delivered at the seaboard for shipment. At this stage four of them selected from the lot were sent to the Navy testing field at Miami, Fla. A test and inspection there revealed the same defects that were reported by Gen. Pershing and some others. The commandant, Capt. McCaughtry, immediately reported this fact to the Navy Department, with the result that a cable was sent to Admiral Sims apprising him of the defective condition of those previously sent, while the 100 in crates at the port of embarkation were rejected and returned to the Aircraft Board.

Forty De Haviland 4's sent to a Long Island Field about this time and tested out in the vicinity of New York were pronounced structurally weak and defective. With the production of the De Haviland 4 it has been the same story of changes. Many of these have been made in the plane since the board determined upon its manufacture. Some were unimportant, some extremely so; many of them undoubtedly necessary to its adaptation to the Liberty motor. But they have been made for the most part by automobile and mechanical engineers, having little or no experience in aviation engineering.

On the 28th, 29th, and 30th of July three squadrons of 18 machines, each 54 in all, having been overhauled by American and French mechanics at an American aviation base behind the French lines, were delivered to the front under their own power. These planes are said to have received the approval of Capt. de Haviland after a careful inspection. Assuming this to be true, it indicates that the machines sent over have been carefully inspected and the defects remedied. On August 7 one squadron of these, comprising 18 machines, under command of Gen. Foulois, made an expedition across the German lines and returned in safety to their base. This marks the date of the use of the first American-built plane over the enemy's lines. The committee has no information regarding the character of their performance.

The character of the evidence concerning this machine, ranging from qualified approval to severest condemnation, shows that the De Haviland 4 is chiefly available for observation or reconnoissance purposes. That the War Department and the Aircraft Board share this view is best evidenced by the fact that it is to be replaced by a machine of later design as speedily as may be possible without complete suspension of production.

With the exception of the S. E. 5 and the Handley Page, in parts, no other type of fighting plane can be produced in quantity before 1919.

The U. S. D. 9 plane is a redesign of the British D. H. 9, being a great improvement on the D. H. 4. But the U. S. D. 9 has not yet fully responded to the tests of the military bureau and will go into production only when it does so. The U. S. D. 9A, another and later design, now under test, promises to be a satisfactory machine. If the promise is fulfilled by the tests, the design will be adopted and substituted for the De Haviland 4.

Recognizing the fact that the United States would not produce planes in quantities early in the war, the board contracted with the English and French early in 1917 for a supply of fighting planes. Of these, 2,114, according to the latest testimony we were able to receive, have been from time to time delivered. This enabled us to maintain 13 squadrons of 18 fliers each on the front, a force which is wholly inadequate to meet requirements of modern warfare. It should also be stated that as our troops are moving to France in great numbers, the disparity may increase until we get into quantity production. It is proper to call attention to the fact that at an investigation of the War Department by the Military Committee, held in January and February, 1918, the committee was assured that the French could and would furnish all the combat planes we needed, provided we would send them the raw material, and that this material was being furnished. This assurance was given when the committee showed anxiety at the continued delay in the shipping of planes.

In January Gen. Squier and Col. Deeds testified to this fact and Secretary Baker gave similar assurance to the committee. The facts, however, are as shown by the testimony of Gen. Kenly, given on July 20, that the plan failed for two reasons. We quote his testimony:

"The French contract practically fell down, as you know. * * * It was due to what I consider two reasons. In the first place, the contracts with the French were dependent upon the sending of raw material that was to be furnished by us, and we did not live up to our agreement. * * * In the second place, the increase in German activities in the air caused a change of program in French aviation construction. * * * The French contracts fell down, so that we became more or less dependent upon what could be furnished on this side."

Besides this, many of the machines our men are now forced to use in France are unsatisfactory, but not more so than those used by the French themselves. An Army officer recently at the front testified that the American troops are using many antiquated machines purchased from the French that were discarded by them a year and a half ago. They are using the Sopwith, 1½ strutter, which has been declared unsafe by the French and British for observation work. They are using the A. R., equipped with Renault 220, which has a ceiling of only 10,000 feet. They use a Spad two-seater, which is unreliable and unsatisfactory. They were using a few French Briguet machines and the Salmson, which is a French machine. It is reassuring to reflect that all commands are unified in France, with all lines of the service under a common protection.

The Liberty 12-cylinder engine is an excellent one for the heavier planes and certain other purposes. Its weight of 825 pounds and its 400 horsepower makes it too heavy and too powerful for the lighter types. It is not yet perfect, but it is improving under repeated tests and experiments, which disclose defects for elimination and suggest changes and readjustments of its parts. It is now in quantity production, more than 4,000 having been delivered, and is approved by our allies, who are anxious to obtain more of them than we can at present supply.

In the development of this motor the Aircraft Board has performed an important task, for which due credit should be given. But the announcement that it had been evolved in a few days was unfounded, and the notion which was encouraged that it could be used for planes of all sizes and character was largely responsible for delays to our plane program.

Motor production has proved to be a formidable task, magnified in some degree by the reluctance of the designers to promptly accept and act upon suggestions of imperfections from competent engineers and critics and fliers and make changes in conformity with them.

The manufacture of the best foreign motors, among which are the Rolls-Royce, Hispano-Suiza, and Fiat, contemporaneously with the development of an American engine would have been the sounder policy. That it was partially adopted later confirms this conclusion. We are doing what should have been done a year ago and are producing the 150 and 180 horsepower Hispano-Suiza motor in quantity. Deliveries of the Le Rhone, Bugatti, and 300-horsepower Hispano-Suiza will follow.

American concerns are making the Rolls-Royce motor for the British Government and should long since have been making them for ours. The smaller types of Hispano-Suiza are serviceable for the lighter and faster planes. In view of these conditions, the apprehension of a year ago that we could not produce foreign motors in quantity because of their metrical measurements and intricacies of construction, requiring manual instead of machine work, which we did not possess, becomes untenable.

No fighting plane of American or other design has been built around the Liberty engine, although it is an axiom in aeronautics that planes must be adapted to motors. The Aircraft Board authorized some attempts at this all-important work, one by Capt. La Pere and one by Col. Clarke, the first of which is being tested and developed by the board, with good prospects of success. This should have been done before, as the type must be made effective before the best performance of the Liberty motor can be secured. A Curtiss design also gives promise of satisfactory results in the near future. The motor can be used in some other models with good results, but until a Liberty plane is successfully built around a Liberty motor by competent aeronautic engineers and thoroughly tested out our air program will not be complete.

Inspection

The Signal Corps inspection system has paralleled that of the producers. In some instances it has functioned badly, with the result that defective material has at times been accepted and material condemned and reported to chief inspectors has found its way back to the producer. In some factories the finished product has been accepted, although not up to requirements. Generally speaking, the production and inspection systems of the manufacturers seem to be more co-operative than competitive. We have found no collusion between the official and the private inspector, but the inspection in the past has been bad. The faults of the system are in part due to the incompetency of the inspectors. We are informed that the system has undergone and is now undergoing a radical transformation and is being remedied as rapidly as skilled and efficient operators can be secured.

Training and Testing Fields

The training fields are each designed for 600 enlisted men, 300 cadets, and 72 officers, a total of 972 men, which, owing to the exigencies of the service, have at times been exceeded. This arrangement requires a total of 54 structures of all sorts for each standard field. In addition to these, there are repair and supply depots, balloon schools, experimental stations, radio laboratories, warehouses, quarantine camps, temporary barracks, photograph schools, etc.

Up to May 25, last, there were 31 fields, including balloon schools and experimental stations, and 37 miscellaneous projects comprised in the above recital, not including the training schools at various State and other universities, nor projects recommended but not yet approved by the War Department. Their estimated cost is $52,511,134, of which $39,356,407 have been expended, exclusive of a field at Miami, Fla., established by Col. E. A. Deeds, a member of the board, on his own responsibility (and without the knowledge or sanction of the head of the equipment division having charge of the work), and a night flying route from Dayton, Ohio, to Rantoul, Ill., by way of Indianapolis. The cost of these extra projects was over $400,000. This night flying route was used for the first time on the night of August 12 between Dayton and Indianapolis, and was pronounced satisfactory by Gen. Charles E. Lee and Capt. J. Fitz Morris, of the British air service, and the aviators who made the trip.

The Equipment Division had some difficulty in securing material for construction prior to the advent of Mr. W. C. Potter, now assistant director of the Production Board, since which time there has been much improvement.

The contractors for the work at Langley field and the fields at Dayton were not satisfactory. Upon the whole, the work of construction proceeded fairly well and the structures on most of the fields have been completed.

Langley Field, near Newport News, Va., consisting of 1,650 acres, was selected prior to our entry into the war for a training and experimental field. The estimated cost of its needed buildings, not yet completed, is $3,664,050, of which $2,305,697 have been expended. It seems to have been wisely chosen and well fitted for testing and experimental work. Nevertheless, it was practically abandoned last year for that class of work, and McCook Field, at Dayton, Ohio, consisting of but 200 acres, and practically enclosed by river, trees and telephone and telegraph wires, was selected instead and leased at an annual rental of $12,500. The reason assigned to the committee for this change was the lack of transportation facilities at Langley, although a spur connecting it with nearby railway systems had been constructed by the Government for its express accommodation prior to the transfer. The insufficiency of this reason is emphasized by the fact that about the same time the board selected the Wilbur Wright training field, near Dayton, requiring the construction of a trolley line by the Government, at a cost of $175,000, which is its only line of transportation. The field is now being used by the Bureau of Aeronautics for its military testing plant. McCook Field is not only too small for satisfactory experimental flying, but its environment is unfavorable to its use for that purpose. The board has, however, equipped it with structures costing $920,100.

Adjoining the Wilbur Wright Field is a large warehouse built at a cost of some $500,000. In this warehouse are stored great quantities of supplies, many of which, like machine guns, radio batteries, photographic accessories, etc., are manufactured in the East. To send them hundreds of miles west for storage, reshipping them over the same route back to the seaboard when needed for over-seas uses, is waste. It needlessly adds to railway congestion and should be corrected.

Your committee visited but a few of the training fields, of which Wilbur Wright Field, above referred to, was one. It comprises 2,200 acres and belongs to the Dayton Conservancy Association, and is designed as a part of the bed of a great reservoir to hold back the flood waters of Mad River. Much of it is low and swampy, either on a level with or slightly above the normal level of the stream flow. Any considerable rainfall floods a great portion of it and a rain of 36 hours last March caused an overflow of nearly 2 feet above the floors of the hangars, thus seriously threatening the planes with damage and suspending training completely. A drainage system, since installed, is said to have improved this condition, but your committee is informed that the Signal Corps was advised by competent authority against locating a field upon these premises because of its low and marshy character, and the judgment of the officers and fliers at the field and familiar with the ground was a unit against its adaptability. An excellent stretch of ground within 4 miles of this field, traversed by railway and high above the river level, admirably drained by nature, was available to the board when Wilbur Wright Field was selected.

The large sums expended upon the Dayton-Wright Field, amounting to $2,878,699, and requiring an ultimate total of $3,097,777 and its use for testing purposes, probably demands its present retention if the drainage system referred to shall prove fairly effective. But, when the dam is completed—the reservoir is to be filled—the buildings must be removed or they will be submerged.

More recently the board, desiring an additional field near Dayton, was offered an acreage adjoining the Dayton-Wright Airplane Factory on the east. Inasmuch, however, as insistence was made that the lease be executed to the Dayton-Wright Co., as lessee for the use of the board, the rental to be made an item in the cost of airplane production, the representatives of the board very properly declined the suggestion, and the project is still incomplete. We feel obliged to note in this connection that shortly before negotiations for the McCook and the new field, Col. E. A. Deeds, a member of the Aircraft Board, was the owner of the first and a part owner in the second. He sold and transferred them to interests with which he had been identified and which now own them.

Contracts for Plants, Motors, and Accessories

At the outbreak of the war but few concerns were engaged in airplane and motor construction; but there were concerns devoted to other pursuits and potentially capable of producing both in quantity if encouraged to do so. The need for planes in volume, and as rapidly as possible, prompted Congress to make the largest single appropriation for the Signal Corps which, up to that time, had ever been made. Since then our engine-producing capacity has been fairly enlisted, while that of plane production has not been properly encouraged. A number of plane manufacturers, like the Wittemann-Lewis Co., of New Jersey, and in the business years prior to the outbreak of the war, have been unable to obtain contracts; while a number of concerns like the Dayton-Wright Co. and the Standard Co. have been practically organized since the war, and the former was given enormous contracts before its factories were completed.

Companies assured of capital and factory space have been denied contracts because they were not going concerns, while other companies in similar condition have received contracts, notwithstanding their present lack of producing equipment. No one official controlled or supervised the making of agreements or their execution. Beginning and ending with the Aircraft Board, the head of production, the director of supplies, the head of the contract section, and perhaps other links made up the chain of procedure. Adopting models of proved efficiency and then putting all responsible producers at work upon them would, in the opinion of your committee, have greatly expedited, as it would have guaranteed, the performance of the aircraft program.

To aid in the construction of the Dayton-Wright plant and the Elmwood plant of the Curtiss Co., the board made generous advances of money, and to them was given the task of making and supplying other contractors with plans, designs, blue prints, and specifications for the accepted types of machines, exclusive of bombing planes. This gave these concerns great advantage over their competitors, which thus became dependent upon them for material without which the work of production could not begin, and when begun was subject to suspension and delay with changes in construction and design. Moreover, the Curtiss Co. exacted a fee for copies of plans, etc of 1 per cent upon the contract price from other contractors, which, although added to the cost of production, was paid to the Curtiss Co., adding a considerable aggregate sum to its revenues.

The number and amount of contracts for planes and motors assigned to concerns at Dayton and Detroit and the number and character of aviation fields at Dayton and could not fail to attract the attention of your committee. Due to her vast automobile industry, Detroit doubtless possessed greater facilities for gas-engine production than any other American community, and the Fisher-Body Co. was well equipped for the manufacture of planes in quantity. A generous recognition of these facts was therefore inevitable.

But Dayton possessed no such advantages. Her manufacturing interests were for the most part in other directions. Industrially considered, the concentration of the greater part of the new pursuits in these two cities may perhaps be justified, but the committee is forced to the conclusion that the personnel of the Aviation Board, from its formation to its reconstruction, explains the fact.

The civilian personnel of the board and their more prominent subordinates were composed of gentlemen a very considerable number of whom lived in these cities and before or at the time of entering the Government service were leaders in and identified with the industrial development of their respective communities. The divestiture of their interests by transfer to others was a laudable though essential step toward qualifying them to public service, but the granting of major contracts to old associates, the transfer of the experimental station from Langley to Dayton, and installing it upon an inadequate tract, quite recently the property of a member of the board, the tender and qualified acceptance of a second field, formerly owned in part by the same member, the selection of the Wilbur Wright Field, physically and geographically unsuited for the purpose, and the giving of huge contracts for airplanes to a corporation created since the war began, of which he was one of the first offiers, and owned exclusively by his former partners and business associates, have provoked, and we think justly, much of the public comment which made the investigation imperative and much of the resentment of less-favored manufacturers in other localities. It is also a distinct argument for those who assume to fear and who assert that aviation, through the board, is to be made the subject of ultimate automobile control. This feature of the subject is, as heretofore stated, under full investigation by the Department of Justice.

Cross-License Requirement

Although this subject has been referred to a special subcommittee for investigation, it has constantly obtruded itself upon our attention, hence we can not avoid referring to it.

The National Advisory Committee of Aeronautics, confronted with the necessity of satisfying the claims of patentees and avoiding possible delays threatened by conflicting patent rights, determined upon mature consideration to settle these difficulties through the agency of a Manufacturers' Aircraft Corporation, to be composed of those engaged in the industry and empowered to license all aircraft contractors, who should pay a royalty to the company upon all planes and parts to be constructed and to assign to the company for the common use all patents or applications therefor owned or controlled by the licensees. The bulk of these royalties was to be paid to the Curtiss and the Wright-Martin Cos. as compensation for the use of certain patents until each had received $2,000,000. These were to be charged against cost of production and paid by the Government. The agreement was sanctioned by the Department of Justice and approved by the Secretaries of War and the Navy.

The committee has not heard a word in approval of it. It is condemned by every airplane manufacturer outside of the immediate beneficiaries. Those executing the license agreements have done so under protest because the Aircraft Board recommended or required it.

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Criticisms of it are numerous, the most serious of them being that it subjects manufacturers to onerous requirements by its beneficiaries, such as assessments for the use of plans and specifications, the purchase of the material and accessories from favored houses, the assignment and surrender of valuable patents and patentable devices to the Aircraft Association upon terms prescribed by itself, the discouragement of invention, and the inevitable control of the aircraft industry by that association or by some other interest through its agency. Your committee sympathizes with many of these sentiments, and notwithstanding the Aircraft Production Board as now officered no longer requires or recommends the execution of the agreements by contractors, we believe the arrangement should be abrogated. We regard it as vicious and as designed to reap large profits by taking advantage of the necessities of the Government. The basic patentees should, of course, if the patents are valid, be compensated, but this should be done by the Government directly whenever the courts finally determine who the owners are and the patents should then be made free to all manufacturers.

New patents of meritorious character should be similarly acquired by the Government as they appear. Such a course would stimulate invention and promote the development of an art which is still in its cradle.

This is not a new departure but rather a reversion to an earlier policy, for Congress in 1917 appropriated $1,000,000 for the purchase of aircraft patents, which sum is still available, and if insufficient for the purpose it can be easily increased. The Government should never be made the victim of a patent monopoly which it generously created for the sole protection of the inventor against infringment by persons and corporations.

Difficulties of Aircraft Production

Much can be said in extenuation of the disappointments encountered in aircraft production. The industry is new and highly technical. Mechanics skilled in the art were few when the war began, and of aviation engineers there were scarcely any. Production capacity was undeveloped, and even planes for training were not immediately obtainable. Up to January, 1917, only 118 aeroplanes of all types had been delivered to the Army, 64 of which were made in 1916, and there was no aircraft organization either in the Signal Corps or out of it. The Bolling Commission was not sent to Europe until June, and its report was not received until September. But for the glowing forecast and optimistic announcements which the board and others made to the public from time to time regarding its actual and prospective performance, and the certainty of speedy and unlimited production, public disappointment would not have been so pronounced nor public resentment so widespread. Great Britain in 1915 and 1916 experienced delays, miscarriages, and expenditures. Instead of profiting by her experiences the board incurred similar ones and accentuated them by representations and assurances which were not warranted by the actual facts.

The order of the President creating a Military Bureau of Aeronautics and a Director of Aircraft Production and the appointment of Gen. Kenly and Mr. Ryan as the heads of the two divisions is an improvement upon the previous situation, and a number of the conditions we have criticized have been or are in the process of being corrected and better methods instituted. For example, a single board of engineers formed by combining the technical and production engineering sections and headed by a chief selected by Mr. Ryan, with the approval of Gen. Kenly, has been established; one testing board under the command of a single officer has succeeded the double system formerly doing the work. The Military Bureau, under agreement with the director, after thorough experiment by actual fliers and aeronautic engineers, now determines the character of machine to be produced, and the business of the director is to produce it.

Recommendations

1. The inspection of the finished product and other material is now the work of Gen. Kenly's division and is to be done by thoroughly competent officers. Work not satisfactory to Gen. Kenly or not up to the requirements of his Bureau is rejected. Cooperation for the common end has been, and we hope will be, observed by the heads of the two divisions and required from their subordinates. The loose ends of the former organization have been gathered up as rapidly as possible, and the results of the improved conditions are already apparent in some directions. But the system is still subject to the criticism that it is dual in character, which is unsatisfactory, since it may at any time lead to differences and to division of responsibility. We are constrained, therefore, to renew the committee's recommendation of last April, sustained by the opinion of every man whose views were consulted by us, that the whole subject should be under the control of one man. Our present organization is faulty because divided into two parts with a man of strong will and opinion at the head of each division. While these two divisions are correlated, they may not be permanently coordinated. Your committee therefore believes that the importance and magnitude of aviation as a permanent branch of our military organization requires one directing and responsible head both for its efficiency and speedy development. Its classification with the Army and Navy as a distinct arm of the service is essential to this end.

Of comparative insignificance at the outbreak of hostilities in 1914, aviation has become indispensable in modern warfare. Without aircraft no army can any longer hope to triumph or, indeed, to escape inevitable defeat. Without aircraft the most powerful navy must in these days remain upon the defensive. The aircraft force of Great Britain and France each outnumber the Regular Army of the United States when we declared war, and ours should soon be as large as theirs. It is a distinct arm of the service. Great Britain and France, recognizing its supreme importance and the need of its swift expansion, last year each converted it into a department of its own, whose head, as minister of the air, ranks as an officer of the cabinet, who is held responsible for efficiency of production and manufacture and an efficient force of aerial fighters. We should do likewise—create a department of aviation, under the control and supervision of a secretary, and ranking with those of the Army and the Navy. We would thus place power and responsibility in the hands of single man, organize a service not alone for this war but for all time, and establish for the forces of the air the same policy of administration that has so long governed those of the land and of the seas.

The cost of equipment and maintenance is rapidly approaching that of the Navy, while training for aviation is as distinct and as technical as that for West Point and Annapolis.

The creation of the department of the air would unify the service, thus removing all friction between the Army and the Navy divisions of the service by subjecting both to the control of a common head. Differences between them under present conditions are unavoidable, and, while more disagreeable than serious so far, they will arise from time to time, tending to seriously disturb the service, besides interfering with production.

2. A commission of engineers and pilots for observation at the front, formed in relays and reporting in person to the department at frequent intervals, is also imperatively demanded. The betterment of the air service through the exigencies of actual warfare is rapid and important. They should be accurately promptly reported in detail to the home office, and this can be efficiently done in no other manner. Similar conditions have long been maintained by our allies, whose policy in this regard we will do well to adopt.

3. But your committee feels that the prime need of the hour is machines in continuing quantity, and the production of them should be accelerated by enlisting the constructive activities of all responsible concerns engaged or which can be engaged in the business to full capacity. We can not, while the war lasts, have too many effective planes. Supremacy of the air means a speedy triumph. We have hundreds of trained pilots waiting for planes, whose services must be postponed for their production.

Planes to be useful must have motors. These, too, should be in production in every factory that can and will turn them out, due allowance being, of course, made for other equally insistent requirements for ordnance, ships, and the like. If this is done, the results for 1919 will then compensate somewhat for the disappointments of the current year.

4. The rapid development during the war of the aeroplane and its effective use as an important arm of the military, makes it imperative that America give greater attention to the perfection and production of aircraft. This should be done not only as a war measure but as a commercial and industrial necessity.

The importance of a powerful air force and an abundance of heavy artillery can not be overstated in bringing the war to a speedy and successful conclusion. With our vast resources in raw material and our facilities for manufacture we can, by the adoption of a broad program and with the assistance of our allies, obtain the complete supremacy of the air.

Without hesitation or delay we must give attention to this expansion of our aircraft policy. The inventive and productive genius and energy of America must be devoted to the creation and improvement of new types of aircraft and engines. Our present program must be greatly enlarged. The United States should establish at Government expense college and university courses in aero dynamics and mechanical engineering, in addition to courses for training flyers.

While quantity production is essential to the complete equipment of our armed forces, quality should not be sacrificed to quantity. The aeroplane requires the highest degree of skill in workmanship and the very best kind of materials.

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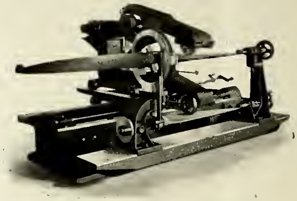

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The aeroplane is a product of American genius, but the credit for its development largely belongs to other nations. America should meet this challenge by bringing the aeroplane to still greater perfection.

5. The inventive genius of the Nation should be encouraged in the most effective way. A Bureau of Inventions, recently established by the War Department, is a step in the right direction. A persistent complaint, doubtless in a large degree due to the disappointment of men whose devices have not been pronounced practicable, is that under the administration of the old board scant consideration has been given to new devices and suggestions. This seems principally to have resulted from the absence of any well-defined individual agency having full authority to deal with the subject. One man, the designer of a model for a dirigible with a car integral with the Blimp, began with the Advisory Committee and was passed on from one officer to another until he finally completed the circle and was referred back to the committee which started him on his journey. About six months were consumed in making the circuit and nothing was accomplished. A plane designer encountered a similar experience, with the added one that his plane was crushed to pieces in a sand test which was declared satisfactory by those who made it but wholly unsatisfactory by those enpowered to make final decisions. Many, perhaps most, of the so-called inventions brought to the notice of the authorities in times like this are of no importance. But if the germ of something new and useful can be detected in one of a multitude of models, the time and energy expended in discovering it will redound to the benefit of the Nation.

6. Ample protection should be extended by the Patent Office to applicants for patents for inventions relating to the public welfare and defense. This is demanded not so much for the inventor as for the Nation. Authority for this now exists, but it seems to be exercised at times and disregarded at others. Additional legislation may be necessary to make this precaution effective, but in the meantime a suggestion from the Production Board to the Commissioner of Patents regarding applications for inventions relating to aircraft would doubtless shield the application from all publicity, thus assuring its indemnity against disclosure to enemy interests.

7. The margin of profit on some contracts particularly for motor production, is altogether too high. According to the estimates of the accounting division they appear to be for the Liberty motor at one of the plants, 33.6 per cent; for Liberty engine aluminum pistons, 285 per cent on capital invested; for the Le Rhone, 92.8 per cent on cost of production; and on the D. H. 4 plane about 50 per cent. This is largely due to the primary unfamiliarity of officials with the cost of rapid manufacture of novel products in great and urgent demand.

The hight cost to the Government having been now demonstrated we feel sure that future contracts will result in great saving to the Government.

8. Planes and engines rejected because of defective construction or materials not furnished by the Government direct should be at the cost of the producer. Existing agreements require payment from the Government for everything delivered, presumably because they have passed official inspection. But when producers are required under their agreements to bear the expense of an inferior product, on the perfection of which human life is absolutely dependent, their own inspection will be of the best and good workmanship will inevitably result.

9. Your committee in inspecting the aircraft plants have noticed the great danger of destruction by fire, owing to the hazardous processes of manufacture, hasty construction, lack of automatic sprinkler and other fire protection.

The burning of any of these factories, in whole or in part, at this time would be a catastrophe, for it would greatly cripple the aircraft program.

We urgently recommend that the requirements of the Fire Prevention Bureau of the National Council of Defense, composed of fire-insurance experts, for better fire protection in these factories be made immediately compulsory by the Director of Aircraft Production, and that a stipulation be inserted in future contracts compelling a compliance with such recommendations.

(*Continued from page* 1225)

Smith, Barrett Putnam..............FLA; DAP
Spriegel, William Robert............SLA; KST
Scobey, Reuhen Bert.................SLA; KST
Shropshire, Nohle Samuel............SLA; CRI
Skagerherg, Rutcher ....GLC
Smith, Stanley............................GLC
Smith, Edson B............................UTA
Schoomaker, Earle W.......................WFO
Seawell, John L...........................WFO
Stevenson, Norman M.......................WFO
Squires, Cameron ....CPA
Stevenson, Raymond V......................FRF
Smith, Clarence Alfred....................TFT
Sihbald, Bruce F..........................FRF
Snyder, Joseph C..........................SMM
Smith, Howard E...........................GLC
Sohn, Elmer L.............................PWM
Spicer, Orville E.........................PWM

T

Taylor, Elmer L...........................LHV
Turner, Luther Martin...............SLA; CLC
Thien, Edmund J...........................KST
Teborck, Joseph Edgar...............SLA; KST
Taylor, Alfred B..........................WFO
Taylor, Russell L.........................WFO
Teeter, Charles...........................WFO
Thompson, William W.......................WFO
Thornburg, David W........................WFO
Trider, George H., Jr.....................WFO
Trueheart, James O........................WFO
Truscott, E. Arthur S.....................WFO
Taylor, Leonard D.........................BST
Tillinghast, Harold A...............FRF; BST
Tussing, Earl B...........................EOT
Thomas, Harvey L..........................FRF
Turner, Lawrence Milford............SLA; CGC
Tupper, Preston E.........................FRF
Thompson, Richard E.......................FRF
Taylor, Everett E.....................Note: 13
Thompson, Charles Dunning...........SLA; DAP
Trefz, Walter.......................SLA; EOT
Trotter, Joseph T.........................FLA
Turner, Wright E..........................FRF
Taylor, Clarence Minor..............SLA; LDT
Tissot, Thomas P..........................FRF

V

Van Duke, John M..........................RSD
Von Hake, Richard Arnold............SLA; KST
Van Vliet, Fred Shiras.........SLR; FRF; LDT
Van Bergen, Kenneth B.....................FRF
Vincent, Osmer Herbert....................LDT
Vines, John O.............................DIK
Vyse, William Clark.................SLA; FLA

W

Watson, William Fred, Jr............SLA; CGC
Walker, Harry Warren................SLA; KST
Wackenhuth, Charles R., Jr................TFT
Whittemore, Chester Leslie..........SLA; CGC
Watson, Edward B..........................DIK
Wikle, James R............................PFO
Williams, James ....LHV
Watson, Frederic Froome Talfourd...SLA; RSD
Wurster, William Frederick..........SLA; GLC
Weissman, Arnold Eugene.............SLA; RSD
Warren, Francis E.........................WFO
Wiliams, Richard E........................WFO
Whiteside, Rush S.........................WFO
Wilkinson, James L........................WFO
Wright, John R............................WFO
Wooddhull, Frost....................SLA; KST
Wheeler, Howard True................SLA; EOT
Woolsey, Clinton F........................DIK
Walthall, Leroy A.........................BST
Weaver, Van John..........................BST
Westall, William H........................BST
Windsor, Thomas H.........................BST
Wolfe, Kenneth B..........................BST
Weaver, Charles J.........................FRF
Whittemore, Hollis L......................BFT
Williams, Errett ....AAD
Wade, Don D...............................DIK
Windsor, Thomas Henry.....................LDT
Wales, Edward V...........................DMA
Walzer, William.....................SLA; DAP
White, Frank Edward.................SLA; LDT
Weitekampe, Elmer J.......................HHN
Waite, John D., Jr........................FRF
Wiley, Dana.........................SLA; RSD
Warren, Francis E.........................FRF
Whitten, Lacey R..........................FRF
Wirz, Walter..............................FRF
Worrall, Anton Wallingford..........SLA; CGC
Watson, John Alfred.................SLA; CGC
Williams, John William, Jr..........SLA; CGC
Wurster, William F........................FRF
Walker, Waldo C...........................FRF
Wagner, Hilton J..........................RWT
Weir, Matthew Stanley...............SLA; EOT
Weaver, Joseph W....................SLA; VDW
Wolff, Herman D...........................FRF
Wood, Rohert V............................FRF
White, Edward Oliver................SLA; LDT
Wilson, Thomas......................SLA; VBW
Westerlind, Carl J....................Note: 13
Wing, Charles R...........................WFO
Wachtell, Morris E........................WFO
Woolsey, Clinton F........................WFO
White, Charles W.......................Note: 4
Wirz, Walter........................SLA; BET
Witten, Lawrence C........................SMM
Wakefield, Marc Everett.............SLA; EOT
Ward, Charles Henry.................SLA; MAC
Williams, Richard Gordon............SLA; CRI
Wright, Clifford Anderson...........SLA; HHN
Wiswall, George H.........................PWM
Waterman, Herhert W.......................FRF
Wootten, Richard Kelly....................PFO
Waters, Leland L..........................FRF
Wilkins, Charles H........................WFO

Y

Yost, Paul K..............................DMA
Young, Carlton Edmonds..............SLA; WFO
Young, Clifford M...................SLA; TFT
Young, Victor M...........................WFO
Younger, John E...........................FRF
York, Duke A..............................PFO
Yerhy, Walter T...........................SMM

Z

Zimmer, Harry Michael...............SLA; KST
Zipf, Oscar Rohert..................SLA; KST
Zimmerman, James L........................WFO

Radio Schools Established at Two Artillery Camps

The War Department authorizes the following:

Training schools for radio work have been established by the division of military aeronautics at West Point, Ky., and Camp McClellan, Ala., Field Artillery firing centers, and instruction work along these lines will eventually be extended to Fort Sill, Okla., and Camp Jackson, S. C., and also to Field Artillery firing centers where observation schools of the division of military aeronautics are now working in co-operation with the Artillery branch of the service.

These are only a few of the first steps in co-ordination that are now being instituted by the different branches of the service in the camps of this country. Heretofore advance schooling was to be obtained only when the American troops reached France.

Instruction in radio covers wireless communication between the flyers in the air and gun crews on the ground below. By means of radio the flyers are able to signal for barrages, the location of batteries, ammunition dumps, infantry, trains, and other targets, and also to "spot" for its own particular battery, which means to tell that battery whether its shells are landing to the right or left, over or under the target at which it is firing.

Fonck Downs Three in Twenty Seconds

Paris.—Lieut. Rene Fonck, the famous French aviator who shot down three German aeroplanes on August 14, accounted for all three of them in the record-breaking time of twenty seconds.

Fonck went out escorted by two patrolling machines. After cruising for ten minutes he spied four enemy two-seater battleplanes flying in Indian file, a few hundred yards between each. He fired on the first with his machine gun and it fell in flames in ten seconds. Then he got his sights on the second machine with the same result. The third dodged sideways before Fonck could take aim and escaped, but by a swift turn he dashed at the fourth plane and sent it down to join the other two.

Recognized as the greatest French air fighter since Capt. Guynemer, Lieut. Fonck is credited with bringing down sixty enemy aeroplanes—six of them in one day in the course of two patrols. He is twenty-three years old and has been in the aerial service a little over a year.

American Naval Flyer 30 Hours in Dirigible

London.—Ensign P. J. Barnes of the United States Navy now holds the record of patrolling for thirty hours in a certain type of dirigible off the English coast. This beats the previous flight record held by him of twenty-five hours and forty-two seconds.

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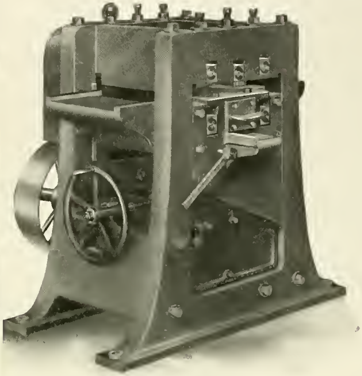

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Manufacturers and dealers are invited to send information to be listed in the Directory to

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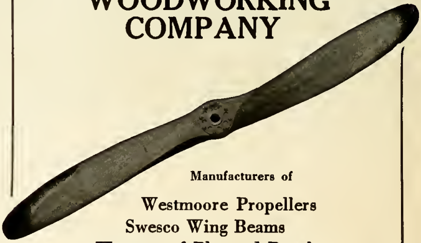

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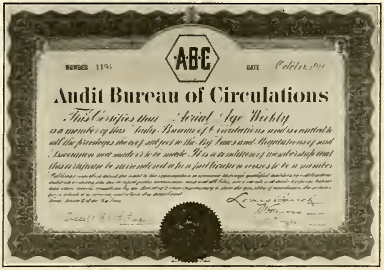

NUMBER 1194 ABC DATE October

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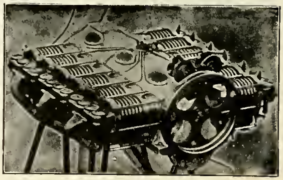

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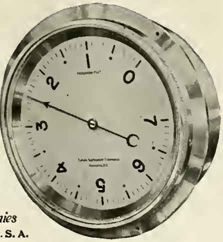

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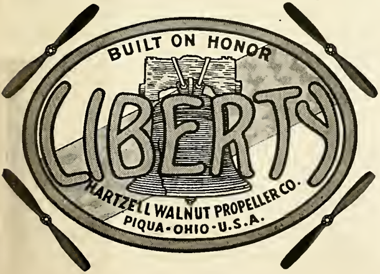
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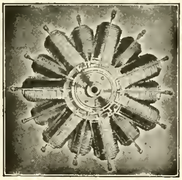

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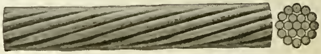

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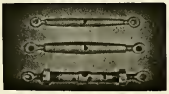

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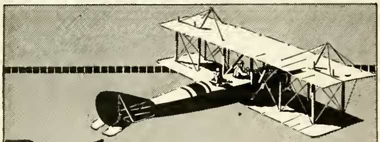

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